E and LP

OCTOBER 1, 1960

NEWS IN PERSPECTIVE

MANAGEMENT VIEW

ANY RATE REDUCTION in these inflationary times is completely contrary to the general trend of the cost of living, so it is particularly gratifying that in spite of these circumstances we are able to reduce the price of electrical service, observed Mississippi Power Co.'s Pres. A. J. Watson, Jr., when the P.S. Commission approved reductions which became effective Sept. 1. Savings to the company's customers in 1961 are estimated at $300,000.

YANKEE OFFERS GREAT PROMISE for New England, predicted Wm. Webster, president of Yankee Atomic Elect. Co., when the nation's newest nuclear power reactor achieved criticality about six weeks ahead of the original target date of Oct. 1. He added: "The growth potentialities in the atomic industry are tremendous. New England with its tradition of energy, ingenuity and pioneering in new ventures is certainly as suited to excel in this sort of industry as any part of the country."

CHANGE OF CORPORATE DOMICILE— Another electric utility, Puget Sound P.&L. Co. has abandoned a long-established corporate location in an Eastern state (Massachusetts) to relocate in its home base (Washington). Pres. J. H. Clawson listed these advantages: relief from (1) recently increased taxes, related fees and costs, (2) the requirement of obtaining double authorization from both Federal and state regulatory bodies for every issue of securities, and (3) the provision in Massachusetts that all stockholder meetings be held in that state.

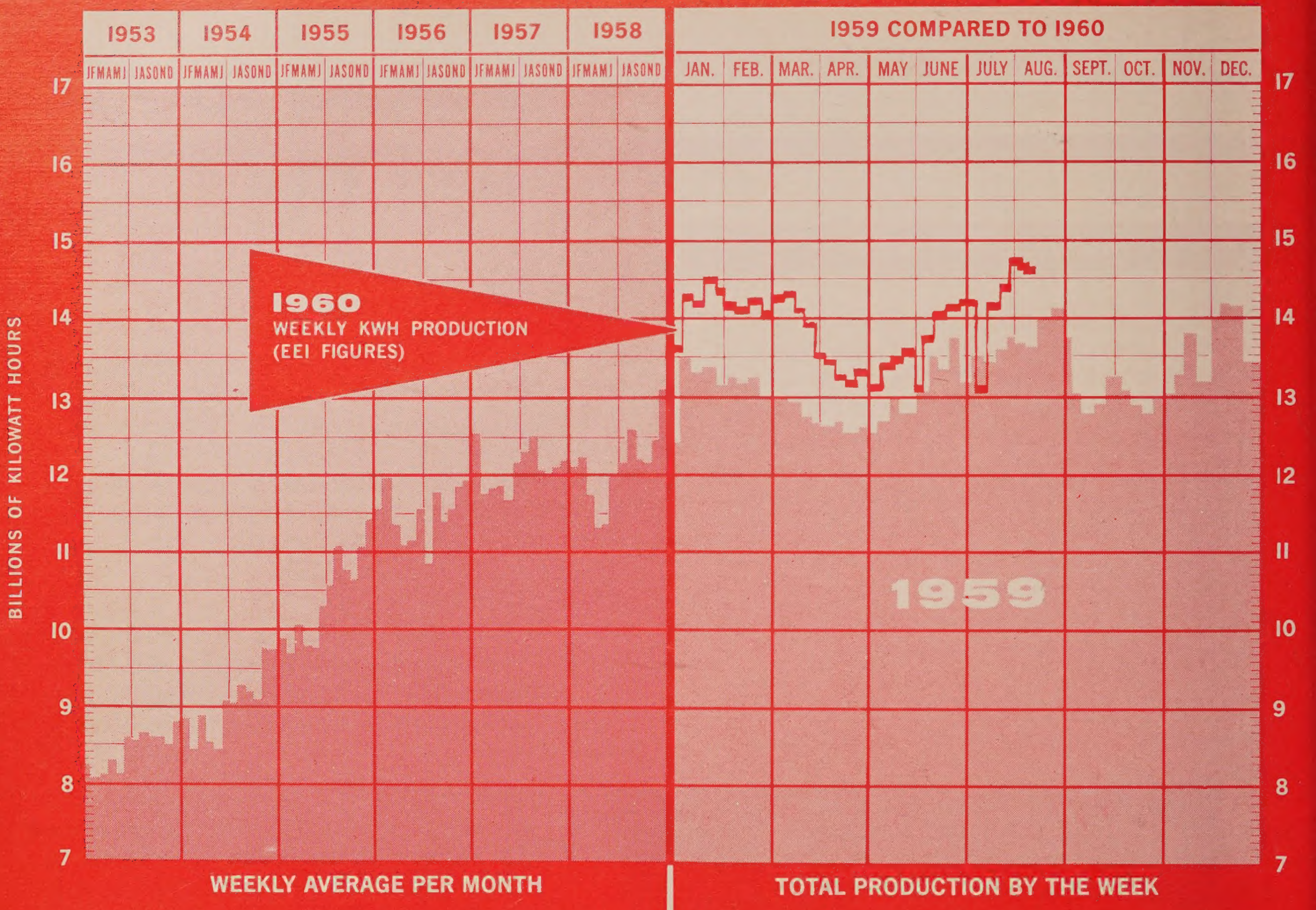
IMPORTANT NORTHWEST POWER to Northern California in quantities larger than two billion-kwh a year, says PG&E's VP Robt. H. Gerdes, would interfere with various state and local agencies which are planning water projects to help make such projects financially feasible. Testifying before a California senate water committee, Mr. Gerdes said: "In our opinion the power from local water development projects should be given priority in the California markets. It does not now appear that PG&E could be party to any arrangement under which we would take any part of the large amounts of power proposed in the plan advocated by the State's consultant (Sol E. Schultz)."

USE OF 800,000-KW GENERATOR UNITS must be studied and maximum resourcefulness and ingenuity must be applied (by those engaged in mining and transporting coal), if the maximum benefits from such tremendous units are to be realized, according to TVA Chairman H. D. Vogel. "Rapid developments in the art of generator design and construction have caused us to expand the planning for an eastern plant in order to assure maximum utilization of and benefits from the east Kentucky coal resources . . . which appear to justify very large units and the multi-million dollar investment required to start such a plant." (TVA has held discussions with manufacturers preparatory to developing specifications for generators in the 800,000-kw range, and by next spring TVA expects to have collected and assessed facts permitting a final decision on site location and construction schedule.)

CLEARING SEATTLE'S SKYLINE, goal of the City's Light Dept., is a project that is meeting with success, announced Lighting Supt. Paul J. Raver. Since last April when City Light embarked on its clearing program, certain facilities have been relocated and duplications have been removed, while underground areas have been expanded . . . including three residential developments which have agreed to install under-

Electric Utility Barometer

(Source: Edison Electric Institute)



NEWS IN PERSPECTIVE

ground distribution systems. Local districts are being encouraged to bring about improvements beyond the scope of City Light's cleanup program, and according to Mr. Raver, "Together, we should do an effective job of improving the appearance of the city."

FRINGE BENEFITS paid to employees by public utilities of all types total 24.3-percent of their payrolls, according to a survey of 123 firms made by the U.S. Chamber of Commerce. This works out to 63.7-cents per payroll hour, or $1342 per year per employee. (Once a year some utility companies, like Pennsylvania P. & L. Co. list all fringe benefits on statements issued for employees . . . and the effect is reported to be "surprising.") Average for all types of firms surveyed by the Chamber is 22.8-percent of payroll in fringes with a total value of $1132.

STRAIGHT-LINE DEPRECIATION ACCOUNTING is being used by over 90-percent of the nation's electric utility companies, the FPC finds. At the end of 1958, the percentage had reached 92, up from 89-percent in 1951, when the Commission last studied the practice. (In 1945 it was 52½-percent; in 1937,15-percent.)

ECONOMIC CLIMATE

UNDERLYING UPTREND FACTORS can be identified in the economic scene. There is no guarantee that they will assure a significant rise in business activity--though many economists feel that pessimism is exaggerated. It provides, at the very least, an indication that a decline in business activity would be relatively easily braked. Of considerable importance is the drop that has been taking place in inventories of both wholesalers and manufacturers. In fact, stocks of some lines have dipped so far that it is clear that a sudden burst of demand would put production on a forced-draft basis.

PERSONAL INCOMES have risen about six-percent so far in 1960. In contrast the sales gain of department and chain stores ranges from 2-percent to 3.5-percent. Sales of autos and other consumer hard goods have not lived up to earlier optimistic expectations. Savings are growing. The trend of the past 18 months--withdrawals in excess of savings--is reversing. Furthermore, there appears to be a growing tendency for consumers to put their extra current income into productive investments.

BUDGET AND TAX OUTLOOK is for continued high spending and income need for the federal government. The final budget of the Eisenhower Administration (now in preparation) is believed to be appreciably higher than this fiscal year's. Congressional actions have assured that the government will be lucky to wind up with a fiscal 1961 surplus of half the hoped-for $4.2-billion. In consequence, tax reductions are pusher farther into the future. Higher expenditures preclude including an across-the-board tax cut among the President's budget recommendations. Though Congress is about to embark upon a large-scale revision of the tax laws, it would be optimistic to expect any major changes next year. Eventually, it is probable that there will be a reduction at the upper and lower ends of the personal income range.

WASHINGTON INFLUENCE

AEC LICENSING POLICY has been questioned by Rep. James Quigley (D., Pa.) in whose district Philadelphia Electric is planning its Peach Bottom A-plant. After consulting with the Commission over the PRDC case now being appealed to the Supreme Court, Quigley disagreed with AEC's policy and questioned whether it was in the "best public interest." It seems to him that "AEC is needlessly gambling with either the public's safety or the public's money, and this shouldn't be." Rep. Quigley has asked to participate personally in Peach Bottom hearings "to make certain that the issue of public safety is squarely raised and determined before construction starts and not after the reactor has been completed." The Congressman also asked for AEC's policy pending a ruling by the Supreme Court. The Commission's general counsel replied that AEC does not consider the Court of Appeals decision "as yet legally applicable to either the PRDC project or the Commission's regulatory program."

ECAP EXPENSES were political in nature and not a business expense allowable in figuring rates, says FPC. The contributions of 76 electric utilities in their 1957 campaign in favor of private power over public power must be accounted for as "miscellaneous income deductions" after taxes are paid. The $2.8-million must be wholly paid for out of profits. FPC held that the advertisements "have not just an indirect relationship to political matters but are directly political."

LIMITS TO FEDERAL POWER activity have been outlined by Assistant Interior Secretary Fred Aandahl. As he sees it, the government should concern itself with "generation, transmission and marketing of hydroelectric power" from multi-purpose projects, and with the "integration with other power supplies of such energy." The "local people" would have "the basic utility responsibility." Aandahl added that progress is being made in contrasts that embody the three-way partnership of public, private, and REA power.

INTEGRATED RESOURCE POLICY by law is being pushed by Sen. Moss (D., Utah). Urging enactment of an Administration-opposed bill establishing and coordinating the federal role in conservation, he stated that "clean, cheap and plentiful water is as worthy of a federal-municipal partnership as electric power for profit is worthy of a federal-corporate partnership." Moss asserted that except for the Colorado River Storage Project, "not a single new major river development program has been authorized for eight years." Moss hopes that the forthcoming report of the Senate Select Committee on National Water Resources "will stake out a red flag" warning of coming crises, both in water availability and in power generation needs. In Moss' view, apparently, as a first step in correct thinking on this subject "we must disenthrall ourselves of the attitude that when a private corporation takes steps to improve plant and facilities the action is good business; but when the commonwealth make similar investments in more basic natural resources, it is waste and unnecessary spending."

MORE REGIONAL COMMISSIONS to study water resources in major basins "would provide a workable organizational arrangement" for planning and revising comprehensive development to meet future needs, according to Deputy Budget director Elmer B. Staats. He saw an urgent need for a "clear, definite policy" for the federal government, "defining both the kinds of developments that are primarily a federal responsibility and a firm formula establishing the extent of federal participation." Staats also directed urgent attention to the problems of uniform evaluation of water sources developments and cost-sharing and repayment by beneficiaries of federal programs.

FOREIGN WATER RESOURCES STUDY--possibly of Communist China and elsewhere --has been approved. (Members of the Public Works and Interior subcommittees last year went to the USSR.)

FOREIGN BIDDERS on Reclamation contracts lost on two out of four contracts although their bids were low even after allowing the 6-percent Buy American Act differential.

INDUSTRY SIFTINGS

FOUR-IN-ONE PROMOTION exploiting the total electric trend--"the most intensive major electric appliance campaign in our history"--is underway in the Chicago area served by Commonwealth Edison Co. Traditionally a user of seasonal single-appliance drives, CE is supporting dealers by extending its low-cost wiring installation plan ($29.95 for any 240-volt wiring) for ranges, dryers and water heaters . . . and all will share billing with all-electric kitchens in the company's advertisements.

SPACE HEATING RATES are coming down, around the country. Examples: Carolina P. & L. reduced its residential rate from 1.9 to 1.5-cents per kwh; Central Illinois P.S. has lowered an experimental rate of 1.85-cents per kwh to 1.75-cents; and Eastern Shore P.S. has cut its commercial and industrial heating rate to 1.5-cents per kwh.

"IMPERATIVE" NEED FOR FUNDS--$73-million--to relight the sidewalks of New York was spelled out recently by the City's Commissioner of Water Supply, Gas and Electricity, who called for an expedited six-year program to replace the current rate that would take 18 years to do the job. (In Chicago recently, sharp inspection of a $3.7-million contract for installation of street lights saved the city $41,000, by calling for 142,000-feet of 2.5-inch cable, cheaper to install than 2-inch cable.)

NEW POWER IN COLORADO--P.S. of Colorado is now building a $3-million ultra high voltage transmission line, the first link in an eventual network of supervoltage lines to carry power over the Continental Divide from West to serve the growth center of Eastern Colorado. And at Nucla, Colo., the Colorado-Ute Electric Assoc. recently dedicated a $13-million generating plant and transmission line to serve four rural electric coop systems with distribution systems in southwestern Colorado and southeastern Utah.

FLUORESCENT LIGHT MILESTONES--A new Westinghouse lamp employing a compound of special green phosphors provides 15-percent more light than standard 40-watt cool white lamps and 36-percent more than daylight type lamps. And, at General Electric "Power Groove" fluorescent lamps--"the world's most powerful"--are in their second million units of production.

THREE-DIMENSIONAL TV via home receivers may result from successful development of 3-D industrial closed circuit television, a San Diego, Calif. electronics firm forecasts. The receivers would have to be of a different type than those now in use, a Cohu Electronics, Inc. official notes.

Stock Exchange Beckons—

Lure of "Big Board"?— Most Utilities On It

"Going public" has now become a major financial movement in the United States, a noted financial writer observed recently. New listings on the various securities exchanges are virtually certain to smash all records in 1960, while the sizable privately owned and over-the-counter stock corporations are fast dwindling.

Yet, more and more companies are putting their stocks on the exchanges every year. The 1960 admissions to the "Big Board" (N. Y. Stock Exchange) totalled 37 at mid-year and are considered certain to exceed the previous peak of 57 set in 1946. (On the American Stock Exchange, which has less rigid rules for admission, new listings for this year are expected to reach 100.)

Most of the larger electric power companies have been "Big Board" members for many years, of course. Of a total of *123*, companies with at least a $10-million gross plant valuation last year, the stock of only *41* was traded over-the-counter, the others being listed on one or more exchanges.

The reasons why corporations list their stocks are quite obvious:

1. Such listings do enhance corporate prestige and attract the attention of investors across the nation and over the world, expanding the potential market (whereas certain investors cannot or will not buy unlisted stocks).

2. Exchange listings usually make it easier for companies to raise new capital, generally at a cheaper net cost.

3. All transactions involving listed stocks are on the record, establishing market prices instantaneously, etc. (whereas the recording of over-the-counter transactions is delayed and prices are not established as quickly over the market area).

Utility companies which are not members of any stock exchange do consider from time to time the advantages of being listed. Middle West Service Co., for example, reports that it has been called on several times in recent years to study utility company situations for the purpose of recommending a decision on stock exchange membership.

Middle West has offered this basic advice, along with specific observations:

"While listing on the Exchange places a stock in a more active market sphere than obtains for unlisted stocks, the market value of the stock thereby becomes more sensitive to the various factors influencing price trends. The effects marketwise of such factors as earnings, dividend rate, economic and political developments, etc., operate regardless of the listed or unlisted status of a stock, but such factors will most likely be reflected more promptly in the market price of a listed stock.

"When a stock previously traded "over-the-counter" is listed on a national exchange, the experience in most cases has been that the interest of dealers who have been active in the stock ceases, and the price of the stock may sag temporarily. However, listing opens new areas of possible growth in the list of stock holders through the interest of certain institutional buyers, trusts and individuals that confine their investments to listed securities. Further, listing gives stockholders the benefit of publicly recorded daily market prices based on open market transactions. The contra consideration is that dealers will promote a market for a utility company's unlisted common stock. Their activities will give a stock a reasonably wide distribution and "market seasoning."

There are, of course, a number of requirements for exchange membership. The New York Stock Exchange places great emphasis on such questions as the degree of national interest in the company, its standing in its particular field, its relative stability and position in its industry and its prospects of maintaining its position. Here, it's apparent that electric utilities have little difficulty in making the grade.

Now and then another electric company is admitted to trading on the "big board." At the first sale of common shares of Orange and Rockland Utilities, Inc., Nyack, N. Y., the utility's board vice-chairman (at left) Charles H. Tenney, II, made the first purchase. In the center is "ORU's" Pres. Chas. L. Hulswit, at right, the Exchange's G. Keith Funston.

Then, the N. Y. Exchange requires that the particular securities for which listing is sought must have a sufficiently wide distribution to offer reasonable assurance that an adequate auction market in the securities will exist. The Exchange also takes into account the effect of concentrated holdings upon the voting position of the publicly held stock.

So, there is expense, responsibility and trouble involved.

What does it cost? Well, the basic initial listing fee for stock is one cent per share for the first 500,000 shares listed, one-half cent per share for the next 1,500,000 shares, and one-quarter cent per share for shares in excess of 2,000,000. The minimum initial fee for listing stock issues of corporations having no other stock listed is $2,000.

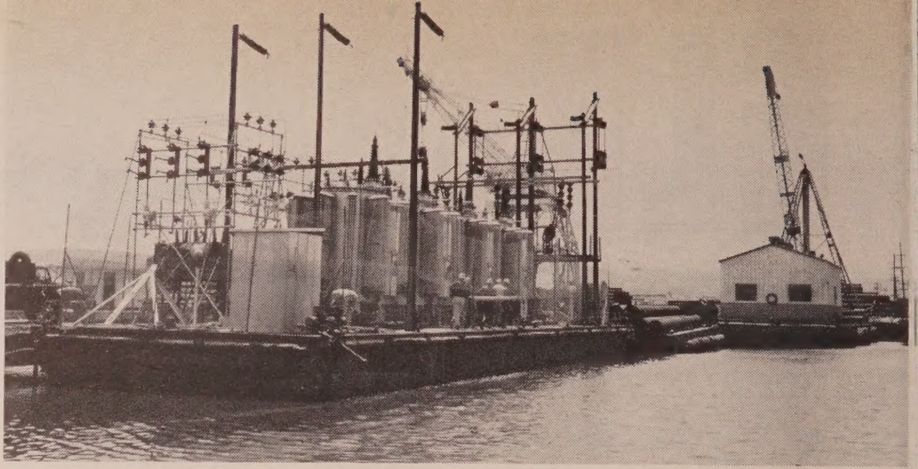
The continuing listing fee for stock is one-tenth of a cent per share for the first 2,000,000 shares, and one-twentieth of a cent per share for shares in excess of 2,000,000. The continuing fee is payable annually for 15 years, but no longer than the stock remains listed. The minimum continuing fee is $500 per annum.

Last time there was a considerable trend to N. Y. Exchange listing of electric utility stock was in the years 1948-1950, many of them resulting from the time that divestment by holding companies took place, or following merger and recapitalization. Some 26 electric utility companies obtained listings for the first time in those three years.

Are there advantages to listing on more than one exchange? Evidently not, for few utility companies are members of more than one. Of the total memberships in the industry, 74 are on the N. Y. Exchange, seven on the American Exchange, one on the Midwest.

One attractive advantage of N. Y. Stock Exchange membership is the opportunity to tie in with the nationwide campaigns being conducted by the Exchange. With a broad education objective, the overall approach is to produce "a nation of more and better informed investors . . . to raise the level of economic understanding among greater numbers of people," according to Exchange Pres. G. Keith Funston.

This Fall, a $950,000 advertising campaign, running in newspapers and magazines, will bring the Exchange's total advertising outlay for the year to $1,410,000—one of its largest budgets. The campaign is featuring a new departure—a special 16-page color insert in this month's "Reader's Digest." Member firms were encouraged to prepare tie-in newspaper ads, which, said Mr. Funston, "could be particularly important in guaranteeing the fullest mileage possible from this special education and merchandising device."



Largest floating electric substation ever built by PG&E, this 110,000-volt marine unit equipped with four 5000-kw transformers has powered a 2400-ton dredge used by the U. S. Army Corps of Engineers for deepening and widening a three-mile section of the channel of Redwood City Harbor on San Francisco Bay. Anchored during the operation, the substation is connected to the dredge by a 12,000-volt armored submarine cable.

Oregon AFL-CIO Rejects "State Power Business"

If new legislation for an Oregon power commission is proposed at the 1961 or future legislative sessions, the state's AFL-CIO organization is on record against the preparation or sponsorship of such bills.

Although Oregon's AFL-CIO state convention delegates meeting generally adhered to the national organization's policy favoring federal development of major river projects, the 1960 gathering backed away from sponsorship of any future legislation to establish an Oregon State Power Commission. The new policy statement departs from the 1958 convention position, which was reflected in two unsuccessful attempts by AFL-CIO leaders to put Oregon into the power business.

The 1960 power committee report, which representatives of the International Brotherhood of Electrical Workers helped to shape, was adopted unanimously by the convention.

Should others put forward such a bill, the AFL-CIO statement said it "must contain provisions to guarantee the right of collective bargaining by the employees of the commission—and provide for final and binding arbitration on wage disputes and grievances." At the same time, skepticism of the ability of the state to enter into binding labor agreements was reflected in the further requirement that "such legislation must contain a provision that the foregoing protections to organized labor shall not be separable from the entire act, in the event they are later declared to be unconstitutional."

An effort of a public power group to put a State Power Commission Bill on the Oregon ballot by voter initiative in 1958 failed when not enough support could be generated to obtain the necessary signatures. An identical bill failed to pass in the 1959 Legislature. Opposition of IBEW members was based on the contention that organized labor, under public ownership, loses the protection of state and federal labor laws.

PG&E Is First in Nation Supplying 5-Million KW

Pacific Gas and Electric Company, which operates in an area of 94,000 square miles in Northern and Central California, has established a new "high" for the United States by becoming the nation's first operating utility company to serve a simultaneous electric demand of more than 5 million kilowatts.

The all-time peak of 5,126,000 kilowatts was reached at 1:30 p.m. on July 21 and this new mark has been confirmed by Edison Electric Institute in New York after a nation-wide check of industry records. The 5 million kilowatt level was exceeded on each of the three preceding days, but by slightly smaller margins.

In addition to the demands of 5,126,000 kilowatts on PG&E network on July 21, connected utility systems carried 352,600, bringing the total for Northern and Central California to 5,478,600 kilowatts. The day also set an energy record with an area load of 107,709,903 kilowatthours for the 24-hour period. Of this total PG&E carried 101,281,703 kilowatthours.

PG&E has a total system generating capacity of 5,265,500 kilowatts in 76 plants—62 hydroelectric and 14 steam—and also purchases power from other sources. The company has 704,500 kilowatts of additional capacity under construction and will start work on 432,000 more when regulatory bodies authorize plans which have been placed before them.

CIGRE Meet Draws 2000; Hear 153 Technical Papers

Almost 2000 electric-power engineers from 43 countries in all parts of the globe met recently in Paris to discuss problems of mutual interest and to keep abreast of modern technical developments in power-system design and operation.

The 10-day meeting was the 18th held since 1921 on a biennial basis of the International Conference of Large Electrical Systems, better known by its abbreviated French title—CIGRE. This is not only the oldest of all International Electrotechnical Organizations, but it is also by far the largest, having 2500 permanent members in 50 countries, and almost 2400 corresponding members all over the world.

Outstanding specialists in all phases of power-engineering presented 153 papers (eight by U. S. delegates), covering generators, transformers, circuit breakers, high-voltage cables, towers and tower foundations, overhead lines—vibrations, insulators, protection and relaying, power system planning and operation—stability, lighting and surges, extra high voltage and direct current.

There were 55 delegates from the United States, headed by Philip Sporn, president of American Electric Power Service Corp.

The presentations of all papers, talks and discussions were simultaneously translated by several groups of interpreters into French, German and English. Earphones and tiny transistor clip-on radios were available to all delegates in all sessions.

At opening session of 18th CIGRE Conference in Paris, J. Jeanneney, French Minister of Industry, addresses delegates. Seated (l to r) are P. Ailleret, assistant general manager, Electricite de France; Philip Sporn, president, American Electric Power Service Corp. and head of the U.S. delegation; J. Mollerhoj, head of the Danish delegation; G. Silva, president; J. Tribot-Laspiere, general delegate and vice president.

All CIGRE papers and discussions at the entire conference were simultaneously interpreted in German, French and English. Earphones were available for delegates in both meeting rooms.

In friendly conversation before the E. H. V. Lines session are M. Henroid, Paris, chief clerk of the Conference; G. Jancke, vice president of CIGRE and chief engineer, Swedish State Power Board; and Philip Sporn, CIGRE vice president, head of the U. S. delegation and president, American Electric Power Service Corp.

U.S.A. delegates comparing notes are J. K. Dillard, Westinghouse Electric Corp., M. C. Westrate, Commonwealth Associates, Inc., and W. S. Price, American Electric Power Service Corp. and secretary-treasurer of the U. S. National Committee of CIGRE.

Discussing mutual problems between sessions are: Charles Concordia, General Electric Co., U.S.A.; S. Lalander, Swedish State Power Board; G. Kogens, Oerlikon Engineering Co., Switzerland; and E. M. Hunter, General Electric Co., USA.

When Performance Really Counts

• Southwire Galvanized Steel Strand

STRAND SIZE	5/8″	1/2″	7/16″	3/8″	5/16″	9/32″	1/4″	3/16″
WEIGHT PER 1000′	813 lb.	517 lb.	399 lb.	273 lb.	205 lb.	164 lb.	121 lb.	72.9 lb.
MINIMUM BREAKING STRENGTH IN POUNDS								
ASTM A-122-54T								
Galvanized (Single Galv.) Common	11600	7400	5700	4250	3200		1900	1150
Class A (Double Galv.) Common	11600	7400	5700	4250	3200		1900	1150
Class A (Double Galv.) Siemens-Martin	19100	12100	9350	6950	5350	4250	3150	1900
Class A (Double Galv.) High Strength	29600	18800	14500	10800	8000	6400	4750	2850
Class A (Double Galv.) Extra High-Strength		26900	20800	15400	11200	8950	6650	3990
Class A Utilities Grade, A.T.&T. and Western Union Spec.—7-wires		25000	18000	11500	6000*	4600		2400**
ASTM A-363-55T (No welds)								
Weldless High-Strength		18800	14500	10800	8000			
Weldless Extra High Strength		26900	20800	15400	11200			

*weight per 1000′—225 lbs. **weight per 1000′—80.3 lbs.

Trapeze artists defy death to please the crowd, but they never take chances with faulty equipment. Care beats dare by far.

So it is with Southwire Galvanized Steel Strand. Manufactured under stringent standards of quality control, it meets or exceeds applicable ASTM specifications . . . is preformed to eliminate flared ends when sheared. Quality extends even to reels which are premium non-returnable type. Comes in 250′, *500′, and 1,000′ coils, and in 2,500′, *5,000′ and 5,280′ reels. Special packaging to meet your requirements is available.

Specify Southwire Galvanized Steel Strand for ground, messenger and guying applications and be sure of quality.

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- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
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WASHINGTON OUTLOOK

by RALPH ELLIOTT
Washington Editor

It *Could* Happen Here

America's shining role as the champion of freedom in a Communist-threatened world has been tarnished by the Democratic platform, and will be further dimmed as the Democrats go into high gear in their campaign to elect a President on the basis of the promises that platform holds out.

Certainly it would have been reasonable to expect that, in the light of world conditions, the framers of a proposed program for running this nation's affairs in the next several years would steer their efforts with greatest caution toward immunizing America—freedom's main bulwark—against the collectivist sickness that has laid low so many once-free countries. Instead, the program adopted at the Los Angeles convention looks more like an invitation to the germs of socialism to do their work.

Taken as a whole, the Democratic platform is nothing short of a paradoxical wonder. It points with tragic emphasis to the millions of souls in the Communist world and its captive nations who have lost their individual freedom to tyrannical governments, and vows that "we will use all the will, power, resources, and energy at our command to resist the further encroachment of Communism on freedom." And the wherewithal to make this resistance, of course, lies in America's vast economic might that has developed under our system of freedom and free enterprise. Says the platform: "Free competitive enterprise is the most creative and productive form of economic order that the world has seen."

Profits!
Profits!
Profits!
PRIVATE POWER
Rich!
Resource Waster!
Selfish!
Small Investor
Roeder
"THAT'S ME?"

Yet, right in the face of these pronouncements, the document's subsequent proposals treating with our domestic affairs merge into a clear blueprint for an outright welfare state. Given emperic study, the Party's succulent promises to dispense the real and fancied needs of everyone cast a shadow in the unmistakable form of bigger, costlier, more meddlesome government, and accelerated erosion of individual freedom. The total picture is one of supercharged New Dealism, hell-bent down the road to Socialism.

The liberal-radical element now in control of the Democratic Party is attempting through a high-powered campaign to sell the voters on the idea that its "something for everybody" platform to spend ourselves into greater prosperity and security can be carried out within the framework of traditional American concepts of the proper functions, duties and limitations of government in a free democracy. But it is all too evident that under this hand-out system of government—the tax, spend, and elect system—freedom must wither as more and more citizens inevitably become dependent upon government for their daily needs.

If the voters buy what the Democrats hold out, the Socialist planners will have moved to the brink of their ultimate goal—collectivism, not through revolution, but furtively through an established political party.

The narcotic argument is being bandied around by some self-styled political sophisticates that party platforms should be taken with a big grain of salt; that after all they are the handiwork of professional politicians whose business it is to win elections, and therefore are understandably patterned to lure the most votes. Also that the principles laid down are not necessarily those which Congress will follow. It has been argued, too, that the Republicans are not guiltless of "platforming," in the name of political expediency, some principles and promises which fall left of center.

The cold facts of experience are far more enlightening, however, as a guide to the true color of the two parties. The details of this country's wild ride down the road to Socialism during the 20 years of new and Fair Dealism are too deeply imprinted to need recounting. It is equally clear that the frightening collectivist momentum of those two decades has been slowed to a walk during the past seven years.

To answer the vital question—will the drive toward Socialism pick up where it left off in 1952 if the Democrats win the election—it need only be pointed out that the liberal-radical element of the Party since that time has succeeded in materially fattening its ranks and thinning out the conservative wing. The Democratic Party is the political vehicle of the Socialist planners.

So the shocking tenets of the Democratic platform add up to far more than a mere play for votes in an ordinary game of politics. They stand out clearly as a warning—grim to Americans who don't believe in compromising individual freedom, and undoubtedly disheartening to our friends abroad who understand all too well what happens to freedom when collectivism moves in.

NUCLEAR NEWS

DRESDEN OPERATION AT 185,000-KWe (net output), without exceeding the license limitation of 630-mw thermal power, can be assumed, GE has announced. Preliminary results of the heat rate tests completed at Dresden demonstrated that the plant is capable of operating continuously under rated steam flow and vacuum conditions, with a net power generation to the Commonwealth Edison system of 182,000-kw. Heat balance readings were made using a gross thermal power rating of 621-mw as a base point, even though the plant was successfully operated at 629-mwt.

SUPREME COURT APPEAL of PRDC decision of the D. C. Appelate Court presents the AEC position that the PRDC license action is similar to eight other cases in which safety findings have been made. On the other hand, holdup of the license approval on safety grounds, the IUE and other unions argued successfully before the Appelate Court, in no way hinders development of the atomic energy industry, nor does it require any change in AEC procedures.

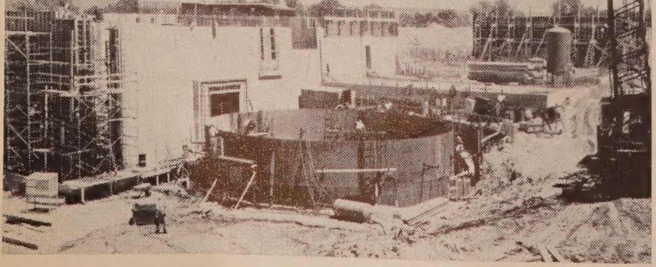
FLORIDA REACTOR PROJECT, slated for revision about the first of the year, is expected to provide for closer alignment of project arrangements with requirements of the third round of the AEC's Power Demonstration Reactor Program. Such a revision would provide the Commission with greater assurance that the prototype (50,000-kw reactor fueled with slightly enriched uranium) would be constructed by eliminating certain of the contingencies in the present contract, according to the AEC. The research and development program related to the Florida reactor project, already reoriented toward the early development of beryllium-clad fuel elements, is expected to delay competion of the proposed plant from one to two years beyond the originally scheduled target date of July, 1963.

EXPERIMENTAL REACTOR PROJECT assignments to private contractors include: Experimental Organic-cooled Reactor operation (at the AEC's NRTS in Idaho) to *Phillips Petroleum Co.;* and the Experimental Gas-cooled Reactor's core component construction to *Baldwin-Lima-Hamilton Corp.* (Pressure vessel, liner and core support for the EGCR at Oak Ridge will be built by Baldwin-Lima-Hamilton at Eddystone, Pa.)

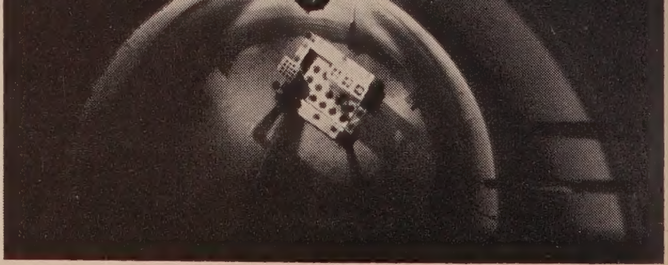
CUSTOMER PROJECTS ON HAND at GE have increased to the point where they have necessitated formation of a new Projects Operations Section in the company's Atomic Power Equipment Dept., says GE. The new section is responsible for APED projects from the time an order is received until the job is turned over to the customer. It is also responsible for preparing propositions and estimates and for providing supporting services to APED's Marketing Section. (In mid-August, APED had 11 reactor projects in design, under construction or nearing completion . . . in addition to numerous contracts for nuclear components, irradiation services and advanced reactor design studies.)

HEAVY WATER REACTOR DEVELOPMENT is being expanded under a new memorandum of understanding agreed to recently by the U. S. and Canada. Both countries have broad R & D programs on heavy water technology underway, including the construction and operation of several experimental and prototype reactor projects on both sides of the border. The cooperative program anticipates at least 10 years of joint effort and information exchange concerning this field of power reactor development.

THE ATOM IN YOUR TOWN—What atomic energy development and application means to local communities is reported in a new AEC publication under the title, "Community Impact of Peaceful Applications of Atomic Energy." Recording the results of a study made by the American Municipal Association, the report, TID-8902, is available from the Dept. of Commerce, OTS (Wash. 25, D. C.) for $1 a copy.



Pathfinder Atomic Powerplant of Northern States Power Co. near Sioux Falls, S. Dakota had reached this stage of construction in mid-summer.



Full-scale mockup of one-eighth of the Pathfinder reactor core, under 18-ft of shielding water, can be studied by Allis-Chalmers engineers.

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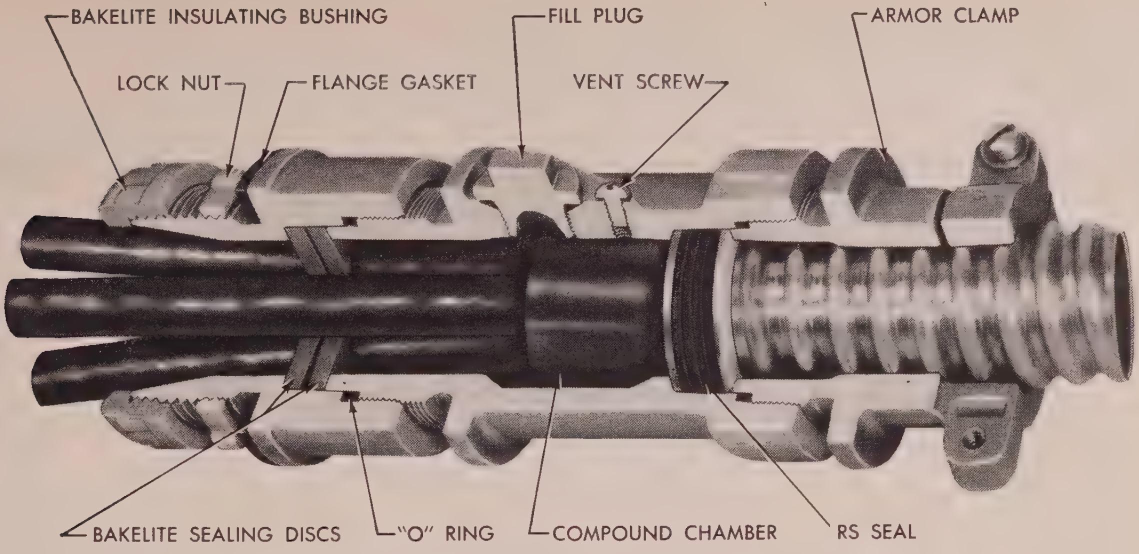

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ECONOMIC OUTLOOK

By A. C. Farmer

Economic Consultant

Manufacturing Industries In An Inflationary Economy

Since the end of World War II, nothing has occurred permanently to change the long-term inflationary trend of the American economy.

Always, after a slow-up in business activity has occurred, the Federal Reserve Bank eventually has taken action to reduce the discount rate, so that business activity would be stimulated by increased borrowing and increased spending of money. Each time this has occurred, the long-term upward and inflationary trend of the American economy again has been established.

In 1960, the first step to prevent a further slow-up in business activity was taken by the Federal Reserve Bank by a reduction in the discount rate from 4 to 3½ percent in June 1960. Further reductions below 3½ percent can be anticipated.

The conclusion recently announced in many quarters, that in 1960 inflation in the American economy permanently has been halted, will be found to be incorrect. It is again timely, therefore, to review the operation of Manufacturing Industries in an Inflationary Economy—a subject previously discussed in October 1957, October 1958, and September 1959.

FINANCIAL REPORT FOR MANUFACTURING CORPORATIONS

	1956	1957	1958	1959
Billings	81.1	79.8	81.8	85.6
Net Profit (before Taxes)	7.5	6.1	7.0	6.7
Net Profit (after Taxes)	4.3	3.5	4.0	3.8
Cash Dividends	2.3	2.2	2.0	2.4
Plant and Equipment	79.2	86.9	90.1	94.4
Inventories	54.8	56.3	53.0	57.9
Total (A)	134.0	143.2	143.1	152.3
Capital Stock	56.3	59.6	61.8	65.1
Retained Earnings	76.0	82.0	85.7	92.2
Total (B)	132.3	141.6	147.5	157.3
Free Assets (C) (B — A)	—1.7	—1.6	+4.4	+5.0
Long-Term Debt (D)	24.2	26.3	28.5	29.4
Total Free Assets (C + D)	22.5	24.7	32.9	34.4

Data abstracted from report by Federal Trade Commission and Securities and Exchange Commission

An examination of the tabulated figures and of the chart shows from 1956 to 1959, there has been only a small increase in billings, accompanied by a slight decrease in profits.

The most outstanding development has been the increase in plant and equipment from $79.2-billion to $94.4-billion, or plus $15.2-billion. This has been made possible by the depreciation reserves and by the increase in retained earnings from $76.0-billion to $92.2-billion, or plus $16.2-billion.

The highly competitive situation for manufacturing industry will require the continuing installation in future years of additional labor-saving machinery.

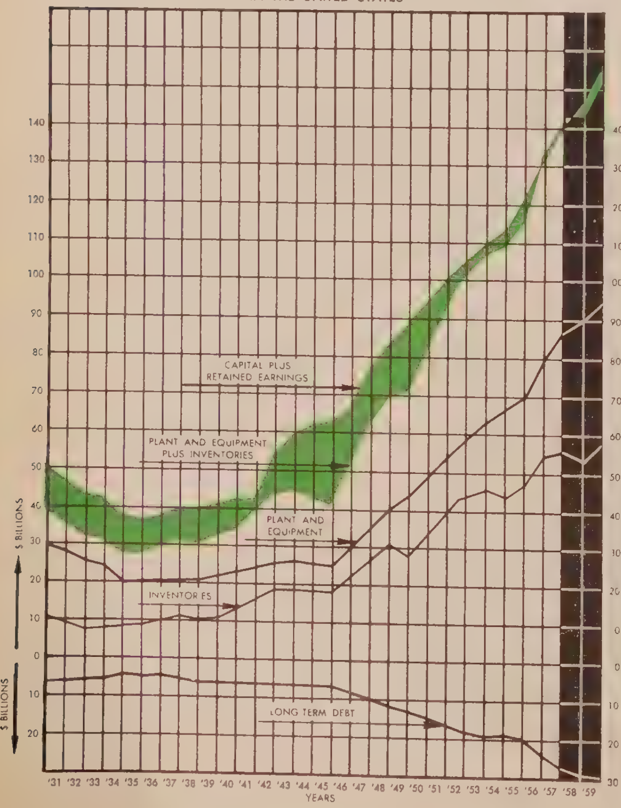
The record shows that in addition to cost reduction programs through the purchase of labor-saving equipment, manufacturing corporations still face the problem of reducing the long-term debt, which has shown an increase from $24.2-billion to $29.4-billion, or plus $5.2-billion.

In this connection should be noted the marked improvement in free assets (excluding the long-term debt). The free assets increased from minus $1.7-billion to plus $5.0-billion, or an improvement of $6.7-billion.

This improvement shows that this problem has been given most serious attention by top management. The results must be considered highly gratifying.

The free assets should equal about twenty (20) percent of the capital and surplus. Recent improvements indicate that within a few years, for the industry as a whole, free assets of twenty (20) percent should be available without reliance on long-term debt. Such a development greatly will strengthen the American economy.

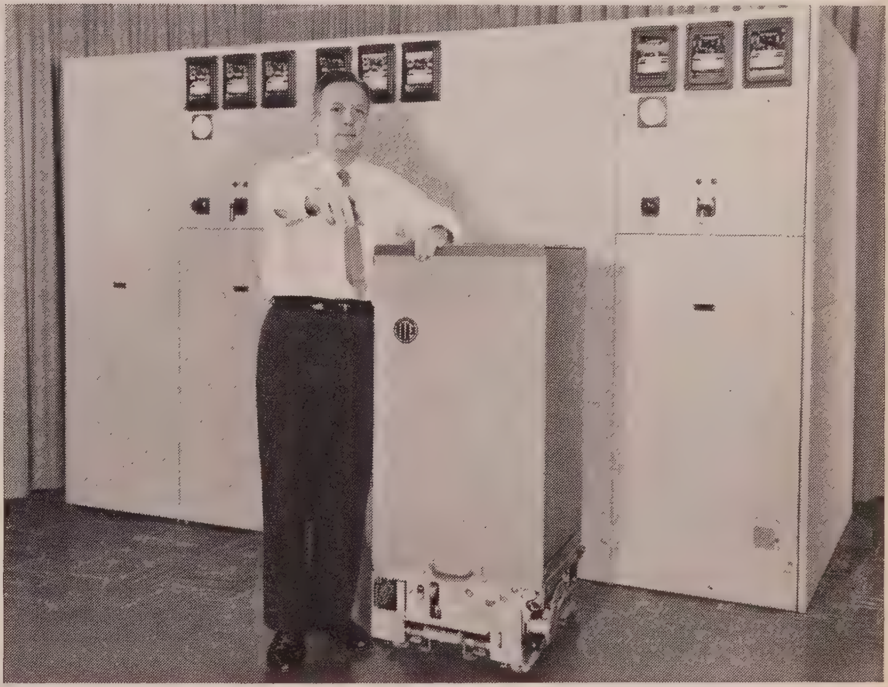
DATA ON ALL MANUFACTURING CORPORATIONS IN THE UNITED STATES



(Advertisement)

"......we knew you would want all these switchgear advances. And we were determined to bring them to you at the lowest possible cost."

—Frederick G. Schmidt, Manager Switchgear Division, I-T-E Circuit Breaker Company



Frankly, we had a big decision to make when we were designing this new HK metal-clad switchgear. Should we go ahead with a complete redesign or should we simply add the new features we knew you wanted to our previous models? The latter would have been easier, and it still would have put us well ahead of the field. But we decided it would be more honest to give you the benefit of as much progress as possible as soon as we could. And we were confident that in this case we could give you all these advances at a price no higher than you would pay for equipment with none of them.

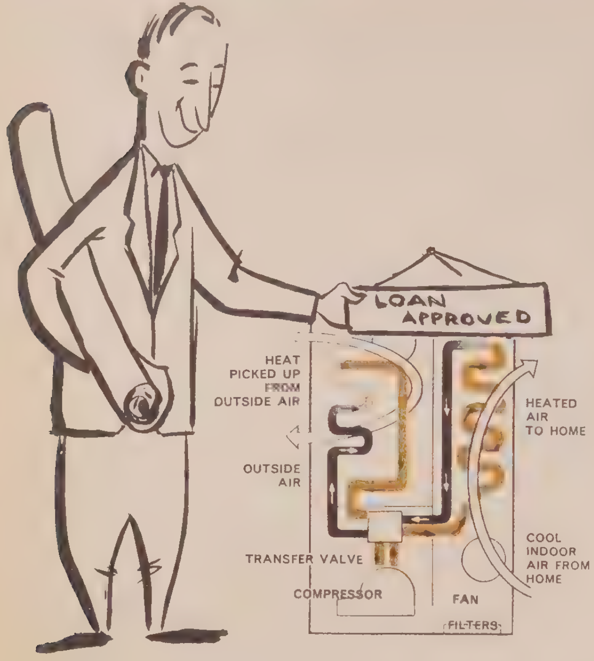
First we wanted to give you stored energy closing. No circuit breaker in this class can really be called modern today without this feature. It insures that you can have fast, uniform closing every time. In fact, I-T-E makes it possible for you to close the breaker even during emergencies when you have lost control power. Fast closing reduces breaker upkeep—prolongs contact life. And I-T-E's motor-driven spring charging mechanism needs only about one-tenth the power of other devices. So you can enjoy the economy of a smaller battery or control transformer.

To give you still greater safety too—again with no increase in cost—we designed this switchgear so you never need open the doors to move the breakers. You can go all the way from connected through test position, to disconnected, and back again with the door closed. Where else can you find safety like this in metal-clad switchgear? Even an inexperienced man can operate it in complete safety. Because we were designing this equipment completely new from the ground up, we had the opportunity to make the components more accessible and provided more elbow room inside the compartments. The bus is higher, for example, making installation and inspection easier. The control cables are brought in at the front for convenience and safe access away from the high-voltage bus. The current transformers are located behind the shutter in the circuit breaker compartment and may be easily changed without disassembling the bus or cable connections.

We were meticulous from the beginning about taking full advantage of the many new materials now available for switchgear use. And through careful selection of materials, skillful arrangement of components, and shrewd economy of space, we were able to give you all these advances in a substantially smaller package as standard equipment. The gear fits under lower overheads and in narrower aisles. Yet it gives you actually more usable space inside than you had before. Circuit breakers are lower, lighter and easier to handle. Instruments are at eye level. We believe you will agree there is no finer switchgear available today anywhere.

A complete description of this equipment is contained in our new illustrated Bulletin 2801-2A. Send for your copy. And ask to see our new sound strip film. We'll bring it to your office. You can see it in 18 minutes. I-T-E Circuit Breaker Company, Dept. SW, 1900 Hamilton St., Philadelphia 30, Pa.

U. S. SAVINGS AND LOAN LEAGUE REPORTS:



WHAT KEY LENDING OFFICERS THINK OF ELECTRIC HEATING

By NORMAN STRUNK,

Executive Vice-President
United States Savings and Loan League

IN THE never-ending battle to improve America's housing, the electrical industry has come up with what may well be a remarkable advance—electrical heating . . . but it is evident that the industry today faces a formidable job in securing public acceptance and usage of its product.

Among those who have to be "sold" on the virtues and advantages of electrical heating are the institutions which supply the biggest single share of home credit. These are the nation's savings and loan associations which currently finance over 40 percent of all homes built or sold.

It would seem of vital importance, then, that the electrical industry know what the key lending officers of savings and loan institutions think of this new method of heating.

To find out what these men think, the United States Savings and Loan League—in its capacity as the national trade organization for more than 4700 savings and loan associations—has surveyed a group of representative savings and loan officials at scattered locations across the country.

The League is releasing some of the findings of its survey to *Electric Light and Power* in the belief that they will be of interest and value to the electrical heating industry.

The objective of the survey was three-fold: (1) To find out just how much savings and loan associations knew about electrical heating; (2) what they thought about it; and (3) whether they were making loans on electrically-heated homes.

Following are some of the general conclusions of the survey:

1. Most of the 50 savings and loan associations surveyed apparently have an adequate knowledge of electrical heating. Only a few displayed no knowledge of the subject; and most of these were in areas in which few electrically-heated homes were being built, or in areas of cheap natural gas such as in Oklahoma and Kansas.

2. Most have either made loans on electrically-heated homes, while others who haven't are willing to do so. Only a few, with bad experience, are reluctant.

3. Savings associations in areas where electricity is cheap (i.e., TVA Area; Columbia River Basin) and where the majority of homes are electrically-heated, are most favorably disposed toward the relatively new heating system.

4. Most are aware of and recognize certain advantages of electric heat. Some even believe it may become the heating system of the future—provided that certain "bugs" are worked out.

As for the general feeling toward electrical heating, savings associations apparently vary considerably in their overall opinions. Comments ranged from that of one Indiana association which said, "for the past two years, we have recommended against such installations," to that of an Oklahoma association (a rarity in that area) which stated flatly: "This is the finest heat I have ever lived with."

The majority of comments, however, fall in between these two extremes. Most associations recognize both advantages and disadvantages; and balance them off against each other in appraising electrically-heated homes for mortgage lending purposes.

Following is a breakdown of the replies to the survey which spell out some of the opinions of selected savings associations on the subject:

COST OF OPERATION:

This appears to be the most formidable obstacle to increased usage. Approximately 60 percent of associations replying cited the higher cost of operation as a major drawback. Some associations expressed concern over the home borrower's ability to carry his home loan because of the increased utility costs with electric heat.

COST OF INSTALLATION:

Most associations commenting on this point said that electrical heating installation costs were the same or slightly less as compared with other types of heating. But five institutions cited higher installation costs as a major disadvantage. For the most part, therefore, the cost of installation may be regarded as a "plus" for electrical heating.

MECHANICAL EFFICIENCY:

The merits of electrical heating were viewed with misgivings by some respondents, with marked enthusiasm by others. On the unfavorable side, sixteen associations questioned the efficiency of electrical heating as a heating medium. Lack of good air circulation was cited as a disadvantage by seven of these associations; excessive dryness of air by five; and excessive condensation by four. Other miscellaneous comments cited the increased cost of installing air conditioning with electrical heating as a disadvantage, the difficulty of conversion to other types of heating, if necessary, and the difficulty of heating basements with electrical heating.

On the favorable side, 13 associations said electrical heating was safer, more comfortable, and convenient (especially with regard to individual room control), and was more effective than conventional heating. Ten other institutions said electrical heating was cleaner and more easily maintained.

MARKETABILITY:

Opinions on this subject were influenced by whether the respondents came from areas of inexpensive electrical power or not. Of those associations expressing concern over the marketability of electrically-heated homes, some indicated a lack of public acceptance or sales resistance to electrical heating; while a few thought that electrical heating was still in the pioneering stage. On the other hand, associations in areas of inexpensive electrical power said marketability posed no real problem.

POTENTIAL:

The majority view seems to be that electrical heating holds considerable promise in the future. One savings and loan executive said flatly that it is the finest heating system now; and one said that installations had improved. In contrast, several associations said that, in their opinion, electrical heating did not do an effective heating job.

PROMOTION:

Here the reaction is mixed. Of those associations commenting on this point, a slight majority said that, in their opinion, electrical-heating people have done a good promotion job of their product; the remainder indicated the belief that the promotion job had been adequate to date.

APPRAISAL POLICY:

Of the executives commenting on this point, a majority indicated they would probably be required to give a lower appraisal to electrically heated homes because of the higher operating costs and/or lack of public acceptance mentioned above. In contrast, those executives located in areas of widespread public acceptance and cheap electric power, said they would give extra value to electric heat in their appraisals. A small portion took a "middle of the road approach," and said they would balance off the convenience and comfort factor of electrical heating against the higher operating cost factor in arriving at value.

Coast-to-Coast Comments: What Lending Officers Have to Say About Electric Heating

Here are some of the coast-to-coast comments from individual savings and loan associations on their attitudes concerning electric heating, indicating the wide diversity of opinion held across the nation:

FROM PHILADELPHIA, PA.:
No need to study merits.

"There has been no need for us to study the relative merits of electrical heating versus the more conventional heating systems."

FROM PITTSBURGH, PA.:
Vs. natural gas—300 - 400 percent costlier.

"Contractors in this area have stayed away from electrical heating installations because they believe the cost of operation would be somewhere between 300 percent to 400 percent of the cost of operation with natural gas. In the rural areas where gas lines are not installed, it is estimated that electrical heating would cost about twice the cost of heating with oil."

FROM ATLANTA, GA.:
On resale, owner would change.

"Our loan officers advise me that they could not approve electrical heating for a speculative house and would only approve electrical heating for a home owner provided the home owner convinces us that he had investigated the system thoroughly and had received a concession from the power company for the price of electricity for operation, and then only with extreme reluctance. The loan would have a penalty applied even if the home owner convinces us that he could afford the electrical heating system—because in all probability on resale the next owner would want to change to natural gas."

FROM SHEFFIELD, ALA.:
This heat can be controlled . . .

"The merits of electric heating in this section (TVA Area) are very high. In this section we would consider that an electrically heated and cooled house would have some advantages over other heating systems. We say this because this heat can be controlled through the working hours and can be stepped up for living analysis and increase the comforts of the home within ten minutes of the time of the increase of the load. In this respect we feel that it does lessen the cost of operation."

FROM EVANSVILLE, IND.:
Analysis based on borrower's ability

"Excepting the fact that electrical heating is likely to cost more to operate, our analysis has been based upon the borrower's ability to live in the house and carry the loan from his income. As a personal opinion, the excessive cost of operation should properly be reflected in value as would excessive taxes or excessive maintenance on a poorly built house."

FROM INDIANAPOLIS, IND.:
Somewhat in the luxury line.

"Our appraisers inform me that several electric heat installations have been changed over to oil or gas heat because of excessive heating bills. In fact, one of our foreclosures in recent years was due to a faulty electric heat installation . . . I believe that at this present time it falls somewhat in the luxury line, but at some future date it will become a very desirable way to heat a home."

FROM FLINT, MICH.:
Found some sales resistance.

"We have not penalized this type of construction in our appraisals but have found some sales resistance to homes with this type of equipment and a recent home was sold approximately for $1,000 less than normal to allow for the installation of a warm air heating system if necessary."

FROM CHICAGO, ILL.:
Costs more to maintain.

"Our credit department indicated it would require a higher personal income in qualifying a buyer in instances where electric heating is installed because it costs more to maintain a home comfortably during the winter time in comparison to other conventional heating methods."

FROM PEORIA, ILL.:
Status of gas 15 years ago.

". . . . It appears that electrical heat is in about the same status currently that most automatic heat, especially natural gas, was about 15 years ago."

FROM MILWAUKEE, WIS.:
We have not been told . . .

"We have not been told by electric light and power groups or the manufacturers the virtues and disadvantages of electric heating. We have not yet placed a loan on an electrically-heated home."

FROM DAVENPORT, IA.:
Sufficient pioneering is necessary.

"Electrical heating would appear to be another in a long chain of improvements in the heating of properties.

"Sufficient pioneering is necessary to obtain market acceptance and establish a sound competitive position."

FROM OKLAHOMA CITY, OKLA.:
Lack of public acceptance.

"No matter what the cost happened to be, we would feel justified in charging a house with an electrical system some degree of functional obsolescence because of the lack of public acceptance of electrical heating."

FROM DENVER, COLO.:
Impractical in our area.

"Electrical heating systems are entirely impractical in our particular area and cannot be justified in the State of Colorado in any other area other than those served only by the Rural Electric Association."

FROM SALT LAKE CITY, UTAH:
Long pull—costs are justified.

"It is our opinion that under a long pull the costs of construction and the cost of electric heating is justified, in that it provides a very pleasant heating system, can be easily controlled from room to room and all of the mechanical cost of motors, filters, etc., are eliminated—and considerable cleaning costs are avoided."

FROM PORTLAND, ORE.:
Past history . . . of high costs.

"In our area there has been poor public acceptance of electric heat, largely due to the past history of poorly-engineered, inadequate installations which resulted in very high monthly costs to home owners.

"The power companies have done a really good job in the last two years in working with builders with promotional houses to educate the public 'To Live Electrically.' As a result of the increased publicity by electric companies, power companies, dealers and manufacturers I believe we will see much more electric heat used in new construction of homes in the future."

FROM SEATTLE, WASH.:
Many homes have idle units.

"Electric heat here, regardless of its merits, if any, over other systems has not to my knowledge been generally qualified as a better heating system. The 'convenience and comfort' are offset by higher operating cost. There are many homes we inspect that have electric units sitting idle in the walls, while a forced warm air plant later installed is doing the heating."

FROM SPOKANE, WASH.:
The difficulty of conversion.

"In places where electricity costs less than other methods of fuel, it is of course predominantly used and is a much better buy and provides better value than any other heating system. Eighty percent of the loans that we finance in one county have electric heat.

"One thing concerns me on electric heat—the difficulty of conversion to another system. We are still sometimes criticized for our archaic insistence on having a chimney included in construction loans where the heat source will be electricity. But our answer is that someday the cost of electricity might make a future owner want to convert to another type of heat. In that case, it is much easier to have an unused chimney opened up and made available for use than to cut one through the middle of the living room floor."

Northwest Power Pool Outage Investigations

Forced generation outage investigations for the Northwest Power Pool were described by Hilton U. Brown III, Puget Sound Power & Light, Lawrence A. Dean, Bonneville Power Administration, and Alfred R. Caprez, Light Div. of the Dept. of Public Utilities, Tacoma, Washington at the recent Summer General Meeting of AIEE.

After extensive analysis of data representing 1767 machine years of hydro-electric generating unit operation, the following conclusions were reached:

1. There is no evidence that unit size is a factor in determining the outage rate for hydro units.
2. There is some very inconclusive evidence that runner type and age have some effect upon unit outage rate.
3. There is substantial evidence that different types of runners experience outages with different frequencies, but that those types subject to more frequent outages are generally restored to service more rapidly after a forced outage, thus tending to keep the over-all outage rates for various types of units in balance.
4. It was found that neither the exponential nor the log-normal distributions fit the collected data on duration of outages well enough to be accepted as the true underlying distribution. However the log-normal distribution describes the data well enough for most purposes.
5. It was concluded that the best over-all outage factor for hydro units which could be determined from the present data was 0.723 percent.

Fight Corrosive Combustion Cases

Because of its corrosion resisting properties as first detailed by Detroit Edison in a report to ASME, NIPHOS nickel-alloy-bonded-steel tubing is being installed as air heater tubing in an increasing number of steam plants, according to Nickel-Over-Steel Div. of M. L. Sheldon, Inc.

In comparing corrosion resistance of stainless, low alloy and metallic coated steels to combat combustion gases emanating from a pulverized fuel-fired steam generator, Detroit Edison concluded that "certain metallic coatings over low alloy steels provide corrosion resistance up to three times as great as that of the low alloy steels themselves." In this connection, the report ranked NIPHOS tubing first "in order of apparent merit."

Underground Sub Supports Parking Lot

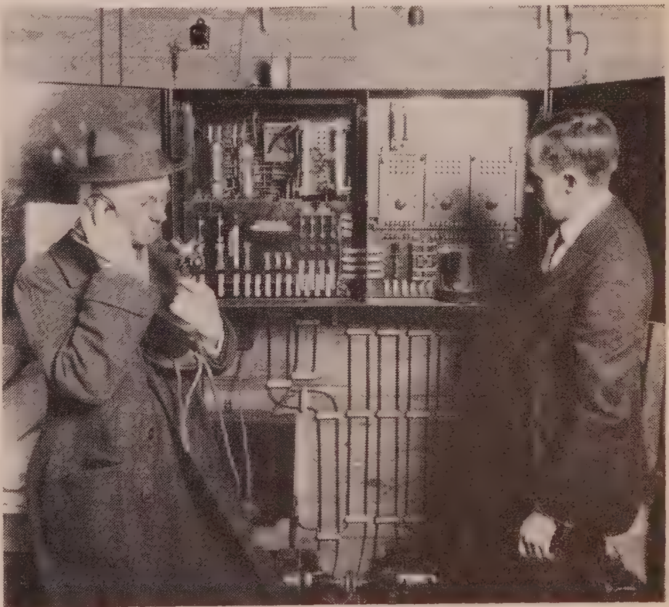
Los Angeles Dept. of Water & Power's underground Distributing Station No. 16 will have a paved roof designed to serve as a parking area. The new station is being constructed to serve the downtown area and relieve the load on other downtown distributing stations.

Total cost of constructing and equiping the new 50-kw station is about $1,486,600. Completion of the underground building and parking lot is planned for December. It should be in service by next April.

Do You Have Oldest Carrier Current?

General Electric Co.—this year marking its 40th anniversary in the power-line carrier-current field—is conducting a nationwide search for its oldest equipment in operation today. Carrier-current being used by electric utilities in four different productive categories—telephone sets, pilot relay sets, coupling capacitors and line traps—is being sought, E. W. Kenefake, carrier-current sales manager, said.

The winning utility in each category will receive from G-E, as an award for the oldest unit, the company's present functional equivalent, incorporating the newest advances in the field. The old equipment, when replaced, will be offered by G-E for permanent museum display. The quest ends Sept. 30.



This power-line carrier-current telephone communication set of the 1920's is typical of the types of units being sought by General Electric Co. in a nationwide search for its oldest equipment in operation today.

Fig. 1—Huntington Beach's 200-mw Units 1 and 2 are at right in this view. New Unit 3 is shown under construction. Unit 4 is also now under construction. These new automated units are each 210 mw, to operate at 2400 psig, 1050F superheat with 1000F reheat.

Computer Control Promises Cut In Generation Cost

Examination is made of underlying characteristics of the power station automated control concept as influenced by the computer.

By A. L. GUIDERO,

Senior Mechanical Engineer
Southern California Edison Company

APPEARANCE of the computer as a practicable control device has opened a new avenue of improvement with which the designer can help to minimize the rate of increase in cost of generation.

A device which incorporates the characteristics of virtually instantaneous diagnosis of change in operating requirements or impending plant problems, with equal dispatch in initiating suitable action provides the tool needed to overcome the natural limitations of human operators. Thus, the introduction of the computer into power plant design can be considered a truly significant advancement in the art.

The remarkable progress of computing equipment and parallel growth in size, complexity and demands on modern steam-electric generating units prompted our Company's decision to go forward with an automated plant design for Units 3 and 4 at Huntington Beach.

The bases for this decision are thoroughly documented in many areas, probably the most complete and authentic of which is a paper entitled "Computers to Automate Huntington Beach Units" by W. L. Chadwick, vice-president of our Company. Mr. Chadwick's paper* covers the specific reasons leading to the decision to automate and describes in detail the computer proper, the philosophy of application and the function and expectations of this new control device. The objective of this paper is to enlarge on the value of the digital computer as a tool, now available to the power plant planner and designer; and describe the present and possible future assignment of computer equipment in the over-all picture of automatic generating plant control.

How Interpret Automation?

It appears that interpretations of automation are virtually as numerous as the total of individuals pondering the subject. This factor, as well as several equally important but less discussed elements, prompted many questions which demanded answers before design could proceed for the Huntington Beach units. The more significant of these questions are:

a. What do we mean by automation?
b. How far should we go with automation?
c. What type of computer should be specified?
d. How many points should be scanned?
e. How many total inputs and outputs will be required?
f. How many inputs should be scanned continuously and how many intermittently?
g. What should the computer scanning rate be?
h. Must all points be scanned at equal rates?
i. How can we achieve the degree of reliability in automated controls demanded by power plant standards of reliability?
j. How can we best handle the sheer logistics of checking the multitude of inter-connecting wires, tubes, instruments, controls, relays and all of the other equipment that will comprise

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*See *Electrical World*, Jan. 18, 1960.

the integrated automatic plant control?

Many of these questions have been answered in the aforementioned paper. However, it might be of interest to explore some of these questions by expanding somewhat on the approach taken in implementing automation into design of Huntington Beach.

Automation Task Force

Our basic concept, as finally adopted for application of computer control, requires that the computer supervise the functions of what is now considered conventional centralized plant control. Such a concept in fact requires of the computer the functions now required of control operators. The intricacies of plant operation thus become more than ever involved in the basic considerations of plant design. For this reason, we were faced with the considerable problem of coordination of operating, instrumentation, electrical and mechanical engineering skills. In order to achieve coordination of these skills, a task force was formed which consisted of the following:

1. An engineer with a background emphasizing instrumentation, from the staff of our Engineering and Construction Contractor, Bechtel Corporation.
2. An electrical engineer from our engineering staff.
3. A mechanical engineer, also well founded in instrumentation, from our engineering staff.
4. Two crack operators from our Operating Department.

The first three of this group had earlier participated in a joint-study group whose report formed one of the principal foundations for the decision to automate.

The task force group was given the assignment of (1) preparing the specification for the control computer; (2) analyzing bids and recommending final selection of the supervisory control computer; and (3) coordinating design efforts in view of assuring that all the major components of plant controls were effectively implemented.

Establishment of such a task force proved to be a highly satisfactory arrangement.

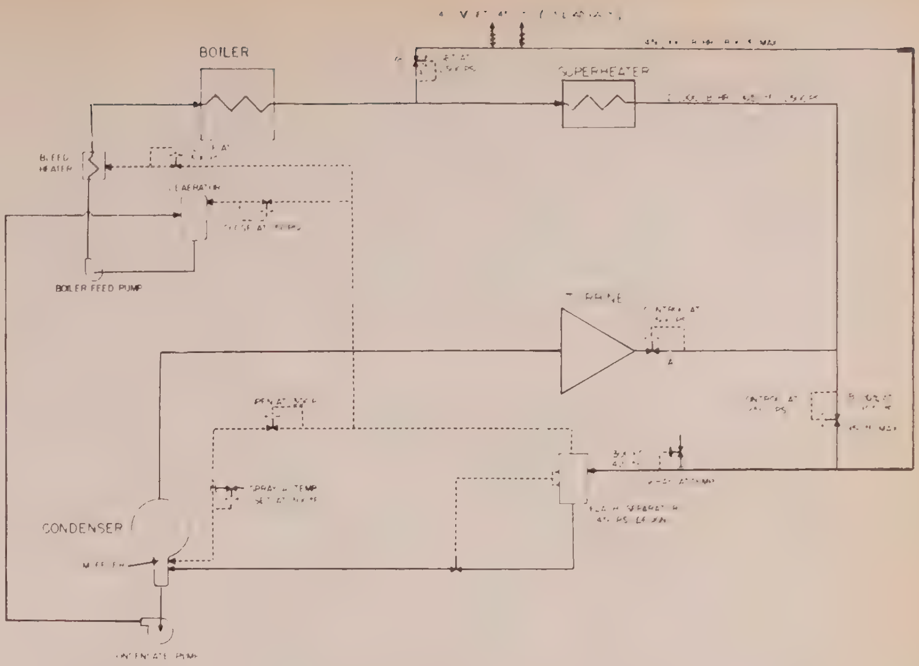


Fig. 2—Simplified flow diagram of universal pressure cycle for Huntington Beach Units 3 and 4.

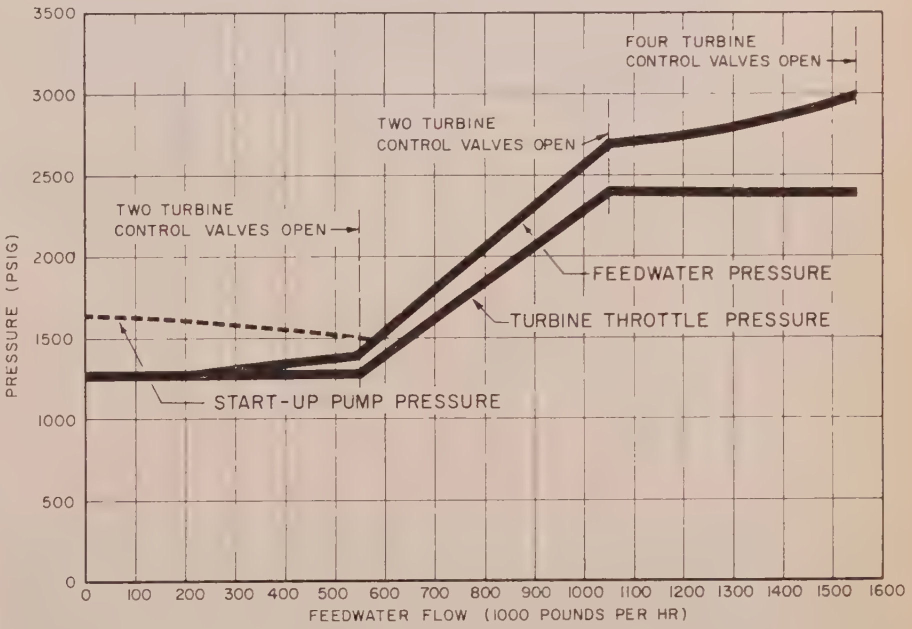


Fig. 3—Sliding throttle pressure curve for Huntington Beach Units 3 and 4. Unit output from zero to one-third is regulated by diverting excess energy to the condenser by means of the by-pass system. From pre-turning gear operation to about one-third output the Supervisory Control System assumes direct command of the boiler and turbine-generator. Outputs above one-third are regulated by conventional sub-loop controls.

Integrated Control Scheme

Plant control equipment for Huntington Beach Units 3 and 4 is designed to control automatically the following basic plant operations:

1. Cold start-up
2. Hot re-start
3. Normal operation
4. Normal shutdown
5. Emergency shutdown

The computer will be in direct control of plant functions principally during start-up procedures. The drum memory has been equipped with a methodical program which will not only supervise but execute the step-by-step start-up functions until the boiler and turbine-generator are operating at minimum normal output. Fig. 5 gives in block-

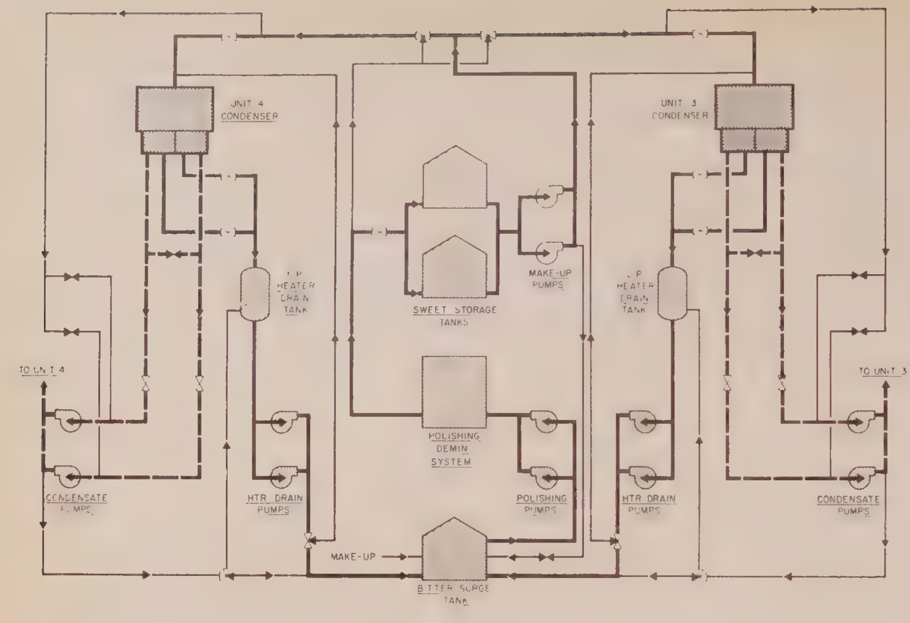


Fig. 4—Basic diagram of condensate polishing system common to Huntington Beach Units 3 and 4. Sub-loop controls within the system maintain a high degree of automation. The computer participates in some automatic valve operations and monitors the alignment of the system.

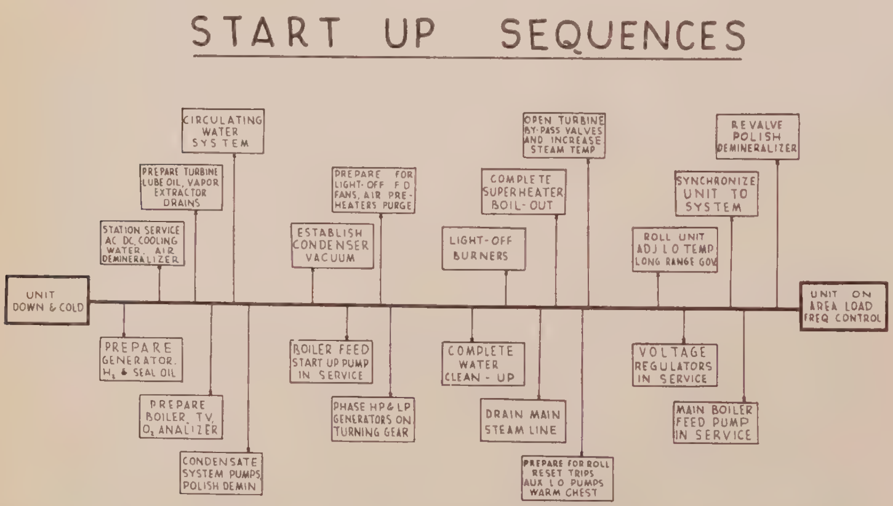

START UP SEQUENCES
CIRCULATING WATER SYSTEM
PREPARE TURBINE LUBE OIL, VAPOR EXTRACTOR DRAINS
STATION SERVICE AC DC, COOLING WATER, AIR, DEMINERALIZER
UNIT DOWN & COLD
PREPARE FOR LIGHT-OFF F.D. FANS, AIR PRE-HEATERS PURGE
ESTABLISH CONDENSER VACUUM
OPEN TURBINE BY-PASS VALVES AND INCREASE STEAM TEMP
COMPLETE SUPERHEATER BOIL-OUT
LIGHT-OFF BURNERS
REVALVE POLISH DEMINERALIZER
SYNCHRONIZE UNIT TO SYSTEM
ROLL UNIT ADJ L.O TEMP LONG RANGE GOV
UNIT ON AREA LOAD FREQ CONTROL
PREPARE GENERATOR H_2 & SEAL OIL
PREPARE BOILER, TV, O_2 ANALIZER
CONDENSATE SYSTEM PUMPS POLISH DEMIN
BOILER FEED START UP PUMP IN SERVICE
PHASE HP & LP GENERATORS ON TURNING GEAR
COMPLETE WATER CLEAN-UP
DRAIN MAIN STEAM LINE
PREPARE FOR ROLL RESET TRIPS AUX L.O PUMPS WARM CHEST
VOLTAGE REGULATORS IN SERVICE
MAIN BOILER FEED PUMP IN SERVICE

Fig. 5—Block diagram of automatic start-up sequence for Huntington Beach Units 3 and 4.

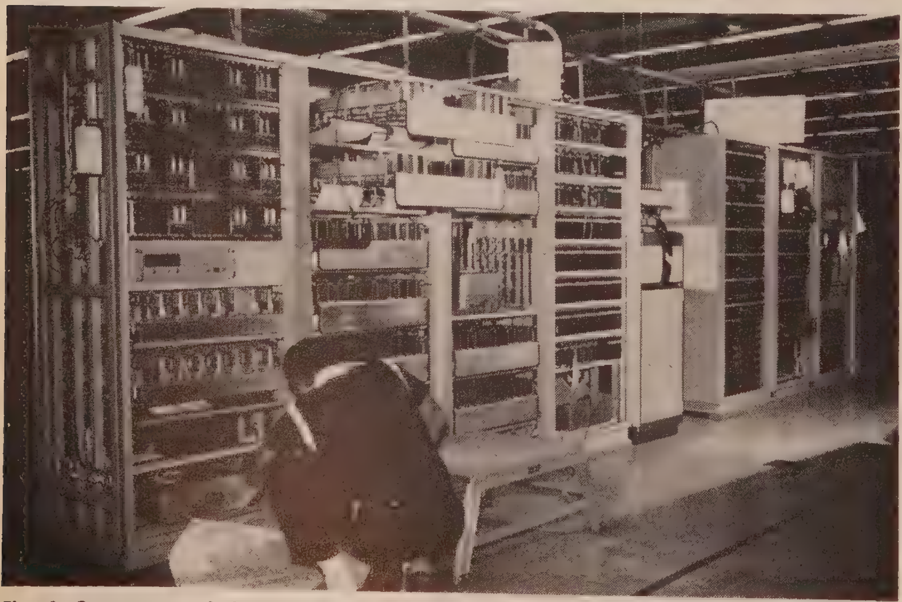


Fig. 6—Components of the automatic supervisory control system being manufactured in G-E's computer plant for Huntington Beach plant.

diagram form the automation start-up sequence planned for the new units.

Normal shutdown operation will be the reverse of this start-up process, while emergency shutdown as in other plants will be accomplished in a manner most suitable to the circumstances.

During the start-up function, direct control will be exercised by the computer or the boiler by initiating burner controls and limiting firing rates until proper working temperatures of boiler metals, gas and steam are obtained. The computer will also control the operation of all of the miscellaneous boiler appurtenances that must be operated during a start-up operation.

Similar control will be exercised by the computer on the turbine-generator. Turbine supervisory instruments will be monitored and start-up guided accordingly. Likewise, generator functions, metal temperatures, both in the turbine and generator will be monitored and various key valves in the boiler and turbine by-pass and feed water systems will be operated directly by the computer.

When satisfactory start-up is complete, the computer will yield plant control and be content to scan, monitor, record, compute and alarm while the plant operates under guidance of conventional control components, such as the boiler-turbine control system and the normal complement of lesser sub-loop controls.

The nature of plant operation and the functions assigned to the various plant controls suggests emphatically that the computer is not the only significant item in the overall grouping of automated plant controls. While the significance of the computer must not be overlooked, it should be recognized that other plant controls, both conventional and specialized, are of equal significance.

Integration of all controls was found to dominate the attention of our designers. The principal groupings of controls applied in automating the Huntington Beach units can be classified generally into the following categories:

1. Computer for control supervision.
2. Boiler-turbine control system

and normal sub-loops for controlling normal operation and providing protection under emergency conditions.

3. Turbine controls for normal, emergency and computer-initiated operation.
4. Boiler controls for normal, emergency and computer-initiated operation.

Turbine-Generator Controls

In a plant employing conventional centralized controls, many functions are performed by plant operators, particularly during starting or shutting down. Since the concept for automated control does not anticipate manual operator assistance for turbine-generator operation, it is necessary to provide suitable operating equipment under the command of the computer.

Each turbine manufacturer was requested to describe in careful detail a step-by-step start-up, normal and shutdown operating procedure. In addition, each manufacturer was requested to submit proposals for furnishing the adjunctory equipment necessary to give the computers control of the main generating units.

The normal sub-loops furnished with the turbine generators include such items as the following:

1. Governor control.
2. Output voltage regulation.
3. Lubricating and temperature regulation.
4. Generator hydrogen temperature and pressure controls.
5. Hydrogen seal oil system.
6. Turbine gland sealing system.
7. All-around safety trip devices.

The additional equipment needed to adapt the main units to automated control is too lengthy to detail here but can be broadly classified into the following groups:

1. Valve operators to perform formerly manual functions.
2. Instruments to detect and transmit intelligence formerly a visual function.
3. Automatic turning-gear functions.
4. Automatic sychronizing functions.
5. Additional thermocouples and pressure-sensing devices to extend the effectiveness of control.
6. A supplemental grouping of

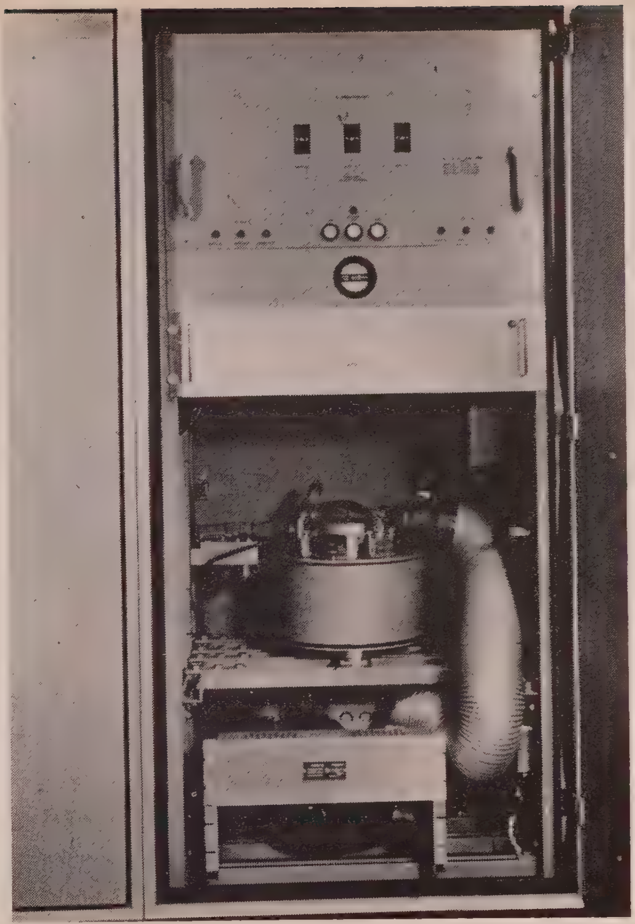


Fig. 7—Drum memory unit of computer for control of automated Units 3 and 4 at Huntington Beach.

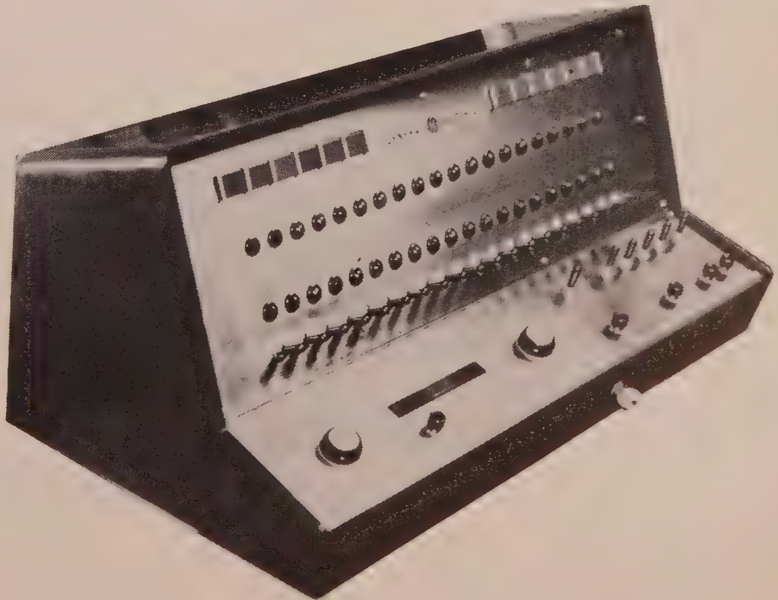


Fig. 8—Programmer's console, the medium by which the computer can be instructed.

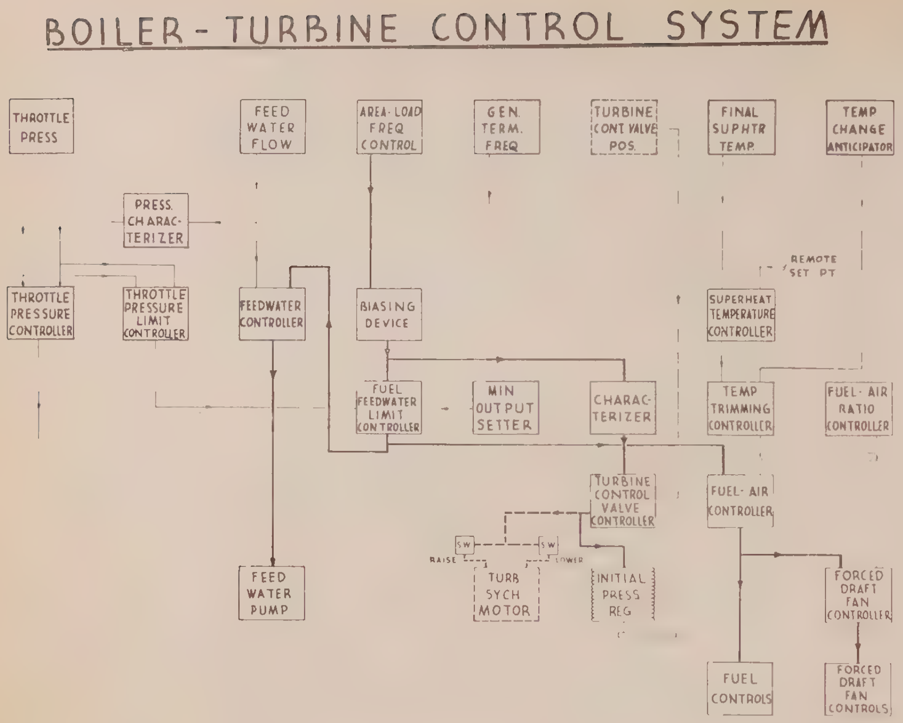


Fig. 9—Diagram of boiler-turbine control system for Units 3 and 4 at Huntington Beach.

miscellaneous switches, relays, filters, transducers, indicators, and other types of instrumentation.

Boiler Controls

Equipment for operation of the boiler by computer command is likewise necessary. The boiler manufacturer responded to our inquiry by providing the necessary step-by-step operating procedure, which in this case departed rather radically from the familiar operating techniques associated with more conventional, drum-type boilers. Successful application of automatic plant control is acutely dependent on reliable burner control and flame monitoring.

Adequate burner operation has probably been the subject of more intense attention by the utility industry than any other single plant function. For this reason, by far, the bulk of boiler automating equipment offered to us by Babcock & Wilcox centered on automatic function of the gas- and oil-burning equipment.

Under impetus of the trend toward automation, some manufacturers are accelerating development of flame-monitoring equipment. This item undoubtedly is the keystone of a control system which will satisfy stringent power plant operating standards and provide operators with the confidence so necessary to a successful plant.

Babcock & Wilcox offered equipment manufactured by the Forney Engineering Company for control of fuel firing on the Huntington Beach boilers. It may be of interest to note that automatic fuel firing had received considerable attention and might well have been incorporated in our latest designs, regardless of the decision to automate.

Boiler-Turbine Controls

As stated earlier, design was predicated on the basis of providing conventional centralized control, should the supervising computer be rendered ineffective for any reason. This concept is recognized in our design in several instances, the most significant of which is the application of combustion-control equipment. However, the ordinary arrangement of combustion control cannot be applied as such to a universal-pressure plant. In fact, the control requirement attendant to universal-pressure operation displays such extraordinary departure from our present design that it cannot be thought of as a true combustion control system and for this reason has been re-named the boiler-turbine control system. Fig. 9 shows a block diagram of the BTC system and illustrates why such a system is not a combustion control in the ordinary sense.

The nature of operation with the once-through, drumless boiler differs from conventional boilers in that the boiler feed pump is the principal pressure control and firing rate is adjusted to maintain steam temperature. In addition, the sliding pressure operation designed into the plant introduces operating qualities somewhat unlike constant-pressure plants. The basic concepts of operation of a universal-pressure plant involve maintaining throttle pressure with the boiler feed pump and firing to control temperature. The conventional plant fires for pressure and controls temperatures by a variety of other means. Such influences produced a specification which shows little resemblance to our previous specifications describing combustion controls.

Essentially the boiler-turbine control system is designed to perform the following duties:

1. Provide the proper working steam pressure at the turbine by regulating boiler feed pump speed through the hydraulic coupling.
2. Vernier plant output by regulating turbine and fuel valves.
3. Provide adequate response to changing load demands while maintaining optimum operating economy.

It was required that this grouping of controls also must be integrated in the over-all plant control, along with the supervisory control system, turbine-generator controls and boiler controls.

Some Expected Benefits

Many of the expected benefits of automated control have already been publicized. Such benefits provided the basis for deciding to automate and for this reason, merit reiteration. A few of those benefits are noted in the following:

1. Safer plant operation.
2. Long-range reduction in overall plant maintenance.
3. Improvement in plant control discipline.
4. Refinement and improvement in reporting and recording of station performance.
5. Some improvement in achieving optimum performance.

The control arrangement attendant to automation has proved of significant benefit in reduction of active control-room area. Control consoles and provision for station annunciation have enjoyed like improvement in compactness, giving operators more ready access to controls.

The operator will be faced with fewer instruments and control devices, thus reducing the chances of confusion. This factor, together with the agile response and watchfulness of the computer, may well produce appreciable reduction in unit start-up and normal shutdown time.

Many records of station performance are recorded and stored as background for computed figures in periodic reports maintained as part of plant operating accounts. Periodic logging of complex computed performance figures will obviate the necessity of maintaining the prodigious and seldom-used files of minor records of station operation. Likewise, the formidable banks of annunciator windows can and have been reduced substantially.

How About Future Designs?

Fundamentally, power plant controls are based on accurate measurement of three basic physical characteristics: (a) temperature, (b) pressure, and (c) electromagnetic deflection. Out of these three fundamental measurements have grown the instrument and control complexes found commonly in today's power generating plants. The successful control of the many large generating plants now operating is adequate testimony to the ingenuity of the control industry. However, the increasing proportions and complexity of modern power plants will continue to tax that ingenuity and inventiveness.

New means by which more accurate and responsive temperature, pressure, flow and electrical measurements are made will be required. Much emphasis on improvement will be needed in the areas of flame monitoring and basic measuring instruments of feedwater chemistry.

The exacting speed demands demonstrated by modern electronic computers is not today matched by the classicly-accepted methods of taking primary plant-performance measurements. Such a thought suggests that more definitive data relating the basic physical sciences applying to thermal power stations must be developed. Perhaps computers, applied in these areas as a research tool, will prove of benefit.

The commercial limits of accuracy, which for many years have been adequate for smaller, less complex machines, are no longer satisfactory. The index of reliability or dependability now available in many commercial control products must be improved to meet growingly rigid power plant standards. Of course, reduction in costs and more compact equipment particularly in motor operators for valves, will be expected, as well as simplification of designs. Much of the foregoing can and will be accomplished when the demand for automating components justifies standardization.

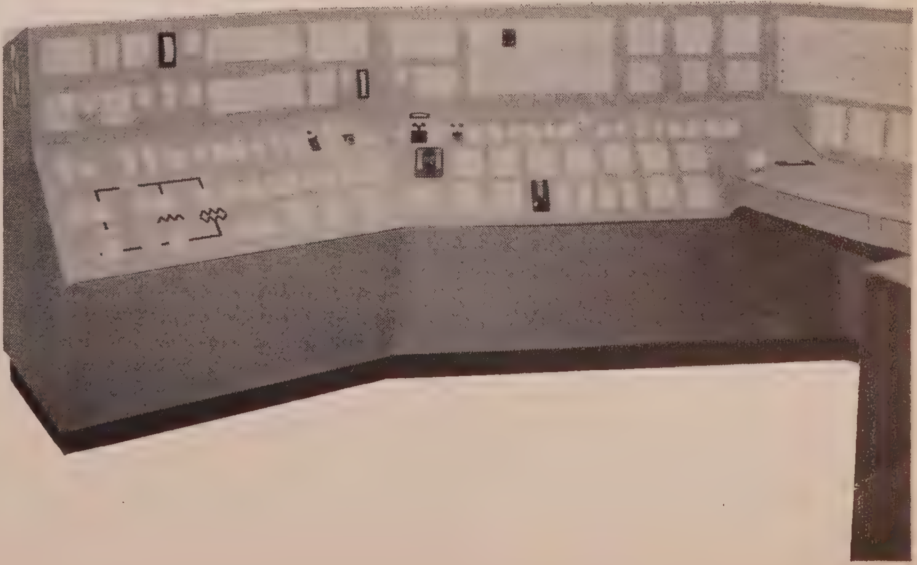
Standardization in the instrument industry of ranges of input and output signals will be helpful. Also, recognition by instrument manufacturers, as well as computer manufacturers, that their products will be sharing common responsibilities and must work as an integrated team. Manufacturers of major plant components must, in design of future equipment, recognize and provide for automated plant control.

While extension of plant control offers many beneficial prospects, it must be recognized that complicating plant additions will introduce like additions in operating and maintenance problems. Many such problems can and have been anticipated.

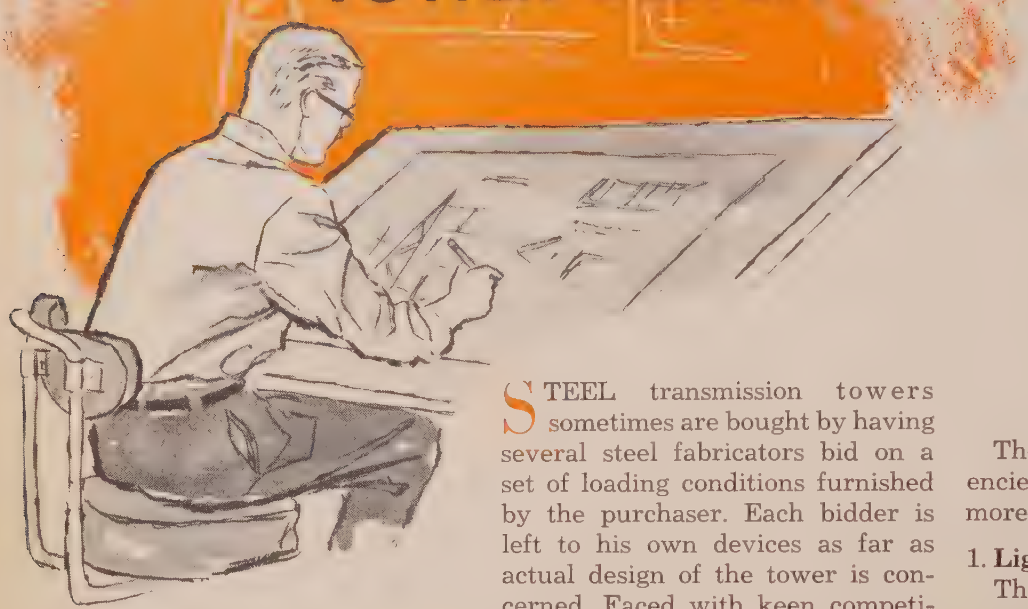
The digital computer, with all of the accessory devices added to produce an effective automatic supervisory control system, represents a bewildering arrangement of relays, switches, wiring, transistors, and all of the multiplicity of other individual components. The possibility of failure or malfunction of any of these components singly or in groups are recognized in design not only of the computer but of the plant as well. Certainly, the provision made in the plant controls for resorting to conventional control in event of computer failure, recognizes the possibility of malfunction of computer supervision. The self-testing routines programmed into the com-

(Continued on page 106)

Fig. 10—Mock-up of plant control console for Huntington Beach Units 3 and 4. The conventional centralized-control instruments appear on the wings or the console; and the sequence control panel, alarm printers, and trend recorders operating with the computers are partially visible on the common section of the console.



GOOD STRUCTURAL PRACTICES, NOT POUNDS, SHOULD DICTATE TRANSMISSION TOWER DESIGN



Inconsistencies and omissions in National Electrical Safety Code provide opportunities for weight cutting where towers are bought by the pound; towers must stand up to realistic loading conditions, many of which are not covered by NESC.

By J. R. ARENA, Structural Engineer
Sargent & Lundy

STEEL transmission towers sometimes are bought by having several steel fabricators bid on a set of loading conditions furnished by the purchaser. Each bidder is left to his own devices as far as actual design of the tower is concerned. Faced with keen competition, prevalent in the tower industry, it is natural for each bidder to seek every loophole possible in order to keep his design down to the least weight possible, and in that way assure himself of a chance for the order. This does not imply that fabricators are poor designers. It means that they are faced with the problem of coming up with a "light" design in order to beat their competitors. It also means that they cannot afford to put too much design effort into the tower because they may not get the job.

Unfortunately, the National Electrical Safety Code, "Bible" for tower design and mandatory in most states, is loosely worded and very easily taken advantage of. It does not clearly define the basis on which a tower must be designed. Perhaps this is intentional since the NESC states, "these rules are not complete specifications but are intended to embody the requirements which are most important from the standpoint of safety to employees and the public." The code also states that, "construction should be made according to accepted good practice for the given local conditions in all particulars not specified in these rules."

Code Inconsistent

The code has many inconsistencies and omissions. Some of the more important ones are listed here

1. Light Loading vs. Heavy Loading

The horizontal wind pressure on ½-in. radial ice-covered wires as specified in the NESC, is 4 psf for the heavy loading district. The horizontal wind pressure on bare wires as specified in the NESC is 9 psf for the light loading district

Based on the above, it is possible to design a tower for a heavy loading district and yet it might be deficient for the light loading district. This would be true in every case where the wire diameter exceeds 0.8 and where only vertical and transverse wind loads are considered. For example, consider a 954 mcm, 54/7 ACSR conductor. For a light loading district, wind load is .897 lb per lineal foot as compared to .732 per lineal foot for a heavy loading district. For a two-circuit line with 1100-ft spans, the tower in a light loading district would be subject to 1090 lbs more load transversely than if it had been designed for a heavy loading district.

This apparent inconsistency is no doubt due to the feeling that southern districts experience more violent wind storms than the north.

It is to be pointed out that the industry uses its own judgment on load requirements and it is common to specify more severe loading than called for in the code if local conditions are such that either more ice loading or higher wind velocities could occur.

2. "The Weight of Ice on Supports is Ignored For the Sake of Simplicity"

This is a direct quote from the NESC from the section on vertical loading. If a ½-in. radial ice is specified on all wires, as is called for in heavy loading districts in the NESC, why should the tower be considered immune to the same ice that forms on the wires? This can be a considerable additional weight to incorporate in the design. If ½-in. ice was considered on all members in a two-circuit, 230-kv tower weighing 12,000 lb without ice, additional weight due to ice on the tower would be approximately 7,000 lb. This is almost equal to the 8000 lb of ice brought into the tower by the ½-in. radial ice on six conductors and two ground wires! So, why ignore it?

3. Effective Tower Area Exposed to Wind

The Code states that where latticed structures are concerned, "the actual exposed area of one lateral face shall be increased by 50 percent to allow for the pressure on the opposite face." And, "The results obtained by more exact calculations may be substituted for the values obtained by this simple rule." Observation shows that the second statement is usually ignored and the first statement, calling for 50 percent of the leeward tower face to be exposed to the wind, is generally the one that has been followed. That this is not a realistic premise is evident when the tower trusses are spaced far apart. Certainly the wind can blow through the open spaces in the windward face, and act on practically all the exposed area of the leeward face.

4. Simultaneous Application of Loads

The Code states that, "When calculating transverse strength, the assumed transverse and vertical loads shall be taken as acting simultaneously." And, "In calculating longitudinal strength, the assumed longitudinal loads shall be taken without consideration of the vertical or transverse loads."

It is hard to imagine that anyone would follow these recommendations literally, but designs have been observed in which the tower was not designed for realistic combinations of specified vertical, transverse, and longitudinal loads.

5. Yield Point

The Code states that towers should be designed using overload factors on the loads, and that the yield point of steel should be used as a limiting stress. Any recognized handbook will show that the yield point of A7 steel is 33,000 psi, but a recent experience shows that some designers are capitalizing on the fact that the actual yield point is not specified in the code.

In the analysis of a recent tower, the designer pointed out that the Code placed no limiting value on the yield point and that since the mill reports showed values for yield point in the 43,000-psi range, his tower was able to take more load and thus would satisfy the NESC requirements. It is common knowledge that yield reports on A7 steel run over 40,000 psi and are generally in excess of the 33,000-psi yield point specified in the AISC. It is unwise to take advantage of this because reports are not consistent and because of innumerable additional stresses that are introduced in a tower because of eccentric connections causing moments and additional stresses.

6. Strength of Foundations

Quoting from the NESC:

A. **Steel Supports**

"The foundations and footings shall be so designed and constructed as to withstand the stresses due to the loads assumed in rule 252." Also, "Steel parts shall withstand these loads with the overload capacity factors specified in table 16."

Rule 252 in the NESC does not mention overload factors. Does the above quotation mean that only if a steel grillage is used shall footings be designed using overload factors and that if a concrete footing is used no overload factors should be used? Some designers argue that this is the intent; but it is certainly difficult to follow the thought here.

B. "Foundations must, in general, be designed to withstand bearing, uplift, and a lateral force tending to slide or overturn them. The downward force need scarcely if ever be considered, as foundations designed for uplift will invariably develop adequate bearing power. Perhaps one exception to this would be in swampy ground where it may even be necessary to resort to the use of piles to give adequate bearing."

The second statement could lead to serious trouble if followed. We have seen instances where soil for resisting uplift was adequate on the basis that it was capable of providing the necessary cone of resistance to uplift, but soil stratum directly below the footing was a material incapable of taking the downward force. An example of this would be sand from the ground surface down to the bottom of the footing and a clay of medium consistency immediately below the footing.

7. Wind On Tower

The NESC states that the tower standing free before the wires are strung, must be able to take a **transverse** wind capable of exerting 42.9 psf on the tower. This is roughly equivalent to a true wind velocity of 103 mph. Yet, this same tower, after all wires are strung, and more surface is exposed to the wind, is called upon to resist a lesser force of 16.5 psf or 64.2 mph!

It will be noticed that the tower is to be designed to take this wind in a transverse direction only, and no mention is made of what wind pressure the tower is to be designed for in the longitudinal direction.

8. Compression Formulas

No ultimate compression formulas for either A7 or high-strength steel are specified in the code.

Naturally, a fabricator bidding in competition, will select one of the numerous empirical formulas available that will give him the highest allowable compressive stress.

9. Tension Members

Another restriction not in the Code, is a limiting L/r ratio for tension members. A designer pursuing a competitive course in the design of a tower could very easily run this value up higher than it should be. Designs have been noticed in which the L/r of some of the tension members was over 1000!

Frequently, tension members acting as part of an X-bracing sys-

(Continued on page 106)

From a spotty 110,000 kw capacity in 1948 to a well-distributed 1,272,000 kw capacity in 1965 is a great achievement for Pakistan in light of her very limited financial resources.

PAKISTAN PUSHES POWER DEVELOPMENT

POWER potential of Pakistan's rivers is conservatively estimated at 10.4-million kw. Yet up to the time of its independence in 1947, only 10,700 kw of this had been developed. Total installed capacity in the whole country in 1948, with its then roughly 72 million population, was only 110,000 kw of which 34,000 kw was in private industrial establishments. Consumption in 1948 amounted to 202 million kwh, of which 73 million were imported from India. This corresponded to an annual per capita consumption of 2.85 kwh!

Areas which became Pakistan in 1947 had been regarded as suppliers of agricultural raw materials only, and what development there had been, in irrigation, roads and railways, was designed to increase the agricultural potential. With the only possibility for rapidly increasing the living standards of the people resting on industrialization,

This age-old Persian wheel, a form of irrigation utilized in Pakistan, is being rapidly replaced by power pumps supplied from the country's new power developments.

Pakistan lacked power for such development. The situation was actually worse, for 90 percent of the installed capacity depended on coal and oil which had to be imported at the expense of the country's very limited foreign exchange earnings. The same held true for the railways. In 1948 West Pakistan mined 241,000 tons of inferior coal and produced little more than 500,000 barrels of crude oil. East Pakistan had no known fuel resources.

Discovery of natural gas at Sui in West Pakistan in 1952 and subsequently in smaller quantities in East Pakistan, has considerably eased the fuel power situation—but in 1958 Pakistan had to pay out the equivalent of $32.6-million for imported fuel and oil, more than 10 percent of total export earnings. Extensive peat deposits have been discovered in East Pakistan, the development of which should ease the power situation in that wing of the country. The extensive search for oil has brought in only one new area so far. The Korsal Well 3 in West Pakistan produces 250 barrels per day.

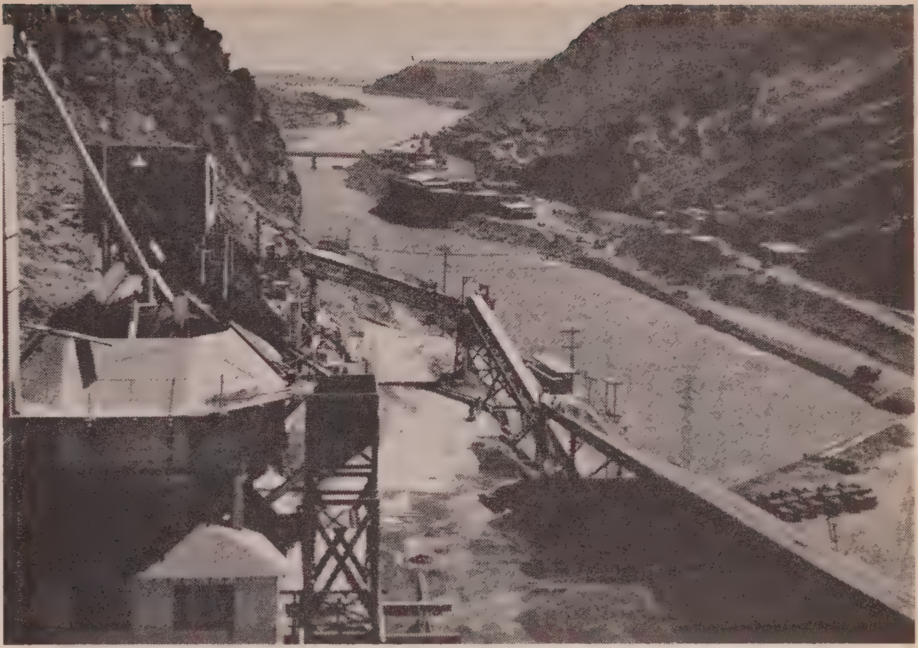
Hydro-electric installations take years to bring into production and added expense to distribute the current. Greater reliance has therefore had to be placed on thermal and diesel plants until the long-range hydro developments can begin producing. In 1958 installed capacity had increased from 110,000 kw to 503,000 kw, of which only 66,700 kw was hydro. Consumption in 1958 had increased to 1530 million kwh, 7.5 times the 1948 consumption. Per capita consumption had increased to 18 units, and will soon reach 30 units.

The rapidity of the expansion can be judged by the fact that installed capacity is expected to have reached 907,000 kw by the end of June 1960, 655,000 kw in public utilities and 252,000 kw in industrial establishments. Of this total, 238,000 kw will be in hydro power, which includes only Warsak (with its 160,000 kw first phase) of the large-scale projects.

Pakistan's Progress Impeded

The shortage of power has naturally impeded the country's development. It has been one of the main causes for the much slower than planned expansion of the jute industry. Exports of jute manufacturing—Pakistan's second largest export—earned the equivalent of $44.5-million in 1959. Had the industry developed as rapidly as planned, those earnings might well have amounted to $69.3-million. The significance of that $25-million not earned because of the power shortage, appears when it is realized that all exports amounted to only the equivalent of $320.6-million in that year. In West Pakistan the power shortage, besides slowing industrial production, interfered with the reclamation by pumping to lower the water table, of hundreds of thousands of acres of agricultural land, 50,000 acres of which are going out of cultivation every year through salination and water logging—thus contributing to the food shortage.

Recognizing fully the need for a hard-driving program of irrigation development and power development, plus unified control of both, President Ayub Khan's Government early created two semi-autonomous Water and Power Development Authorities, one in each wing, to control and expedite the solution of both problems. The result is proving to be excellent. So important was this felt to be, that Mr. Ghulam Faroque, who had made such a success in developing industry through the Pakistan Industrial Development Corporation, was transferred to the West Pakistan WAPDA, and he is now tackling these problems with his well-known energy and success.

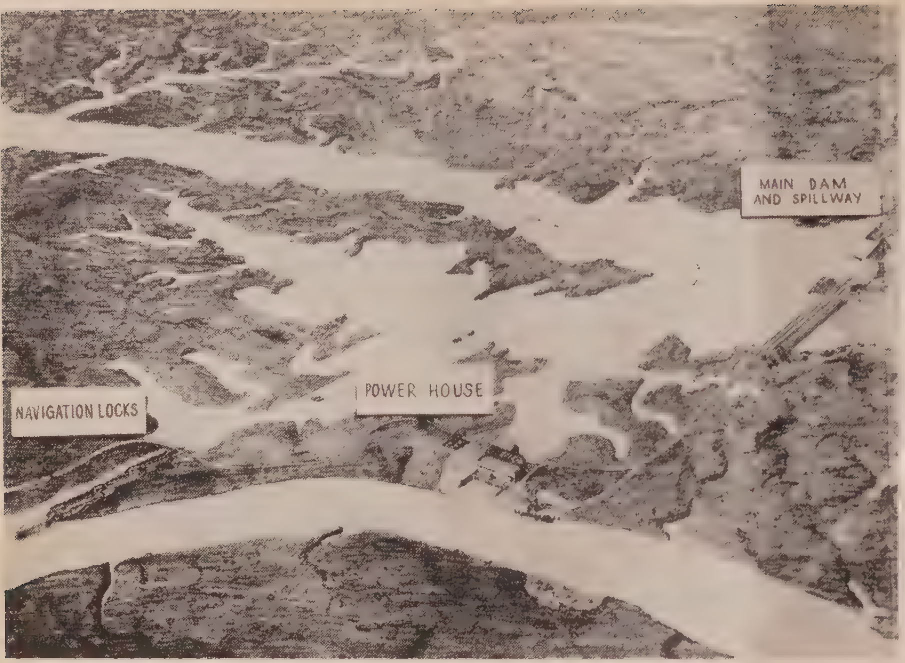

Warsak Dam Project under construction in West Pakistan. Capacity will be 160,000 kw.

Distribution Takes Priority

Another great change is being made. Whereas in the First V-year Plan the equivalent of $72.2-million was assigned to generation, and only $47.1-million to transmission and distribution, the priority has been reversed in the Second Plan (1960-65) with $57.8-million assigned to generation and $141.8-million to transmission and distribution, in the public sector. Adequate firm supply is in not too distant sight, and distribution therefore must take priority.

With the commissioning of the Multan 140,000-kw Sui Gas Thermal Station and the 160,000-kw Warsak Hydro Plant this year, plus roughly 157,000 kw installed capacity in smaller plants already connected on the West Pakistan Grid, the northern and central regions of West Pakistan will have a firm supply of roughly 300,000 kw which will meet the immediate demand for the first time. Commissioning of the Gujranwala and Shadiwall canal fall hydro plants in 1961 will add possibly 25,000 kw to the supply—but by 1962 a shortage will again have developed which will increase rapidly.

The first of the big multi-purpose hydro-electric and irrigation undertakings—the Mangla Dam on the Jhelum River—cannot make its 300,000 kw available and irrigate 3-million acres before 1968. The same is



Artist's sketch of Pakistan's Karnafuli Project in East Pakistan, to have a capacity of 80,000 kw.

true of the huge 600,000-kw Tarbela Dam on the mighty Indus which will also irrigate 4-million acres. The 500,000-kw Kalangi Dam on the River Swat, which will also irrigate 2-million acres, is still in the investigation stage and would take at least 7½ years to build when finally approved and started. None of these can help meet the shortage which will be growing from 1962 on.

To meet the anticipated shortage, WAPDA has already decided to increase the capacity of the Multan Sui Gas Thermal Plant from 140,000 kw to 270,000 kw, which can be done fairly quickly, and is considering adding 80,000 kw capacity to Warsak although it is not certain how much additional firm supply the latter could provide. There is a preference, however, for undertaking immediately the Kunar Valley scheme in Hazara District in the north. This snow-fed river, starting at an altitude of 16,000 feet, drains a catchment area of 1000 square miles. Flowing at steep gradients through narrow gorges, it offers great opportunity for the development of relatively cheap current.

A dam at Paras and a pressure tunnel across a long loop could be built sooner than other schemes and develop 180,000 kw in the first stage, expandable to 360,000 kw. The estimated cost of the first phase is $54.6-million. Application has already been made to the D.L.F. for a loan to cover the foreign-exchange portion of this cost. It will take a further $10.9-million to bring this power from the power house via Wah to join the West Pakistan Grid at Lyallpur.

Distribute Through Two Grids

This power will be transmitted to ten distributing centers by the West Pakistan Primary Grid to be completed in 1961, although much of it is already in use. This will provide roughly 750 miles of 220-kv and 132-kv transmission at a cost of roughly $40-million, toward which I.C.A. has promised aid to the extent of $3.6-million and a D.L.F. Loan has been granted of $15.2-million. Approximately 4,000 miles of transmission lines of various capacities will take the current from the ten distribution centers of the Primary Grid to 25 new centers and to the ultimate consumer. This is the Secondary Transmission system, also to be ready in 1961 at a cost of roughly $42-million toward which D.L.F. have made a loan of roughly $32-million.

These two distribution systems provide the basic structure for West Pakistan's future agricultural and industrial development, electrification of rural areas, development of arid zones and ultimately for the electrification of the North West Railway between Peshawar and Karachi, now using imported fuel.

Treatment of the southern area, and the Baluchistan area, has to be different. The rapidly expanding needs of the Karachi area are being met as rapidly as possible by the Karachi Electric Supply Corporation, in which Government owns a controlling interest. The World Bank has aided this expansion by several loans. But between Karachi and Multan are vast areas with only two large centers, one at Sukkur and the other at Hyderabad. WAPDA is already building a 20,000-kw Sui Gas Thermal Station and Grid to serve an area of 75 miles around Hyderabad. This is estimated to cost $9.3-million, being met from Pakistan's own resources. Similarly a 30,000-kw Sui Gas Thermal Station is planned at Sukkur together with local grid. As in the case of the great Warsak Project the Canadian Government has promised financial assistance toward the $11.1-million cost, under the Colombo Plan. The Hyderabad and Sukkur local grids will be joined and ultimately both of them will be connected to the West Pakistan Primary Grid.

Total electric load of the Baluchistan area covering 100,000 square miles is only about 3000 kw. WAPDA is investigating the possibility of establishing a 15,000-kw thermal plant in the Quetta area using local coal. This will provide cheap power for irrigation in the Quetta Valley long famous for its fruit and nuts; for the mechanization of the coal and chromite mines; and for the processing of mineral deposits.

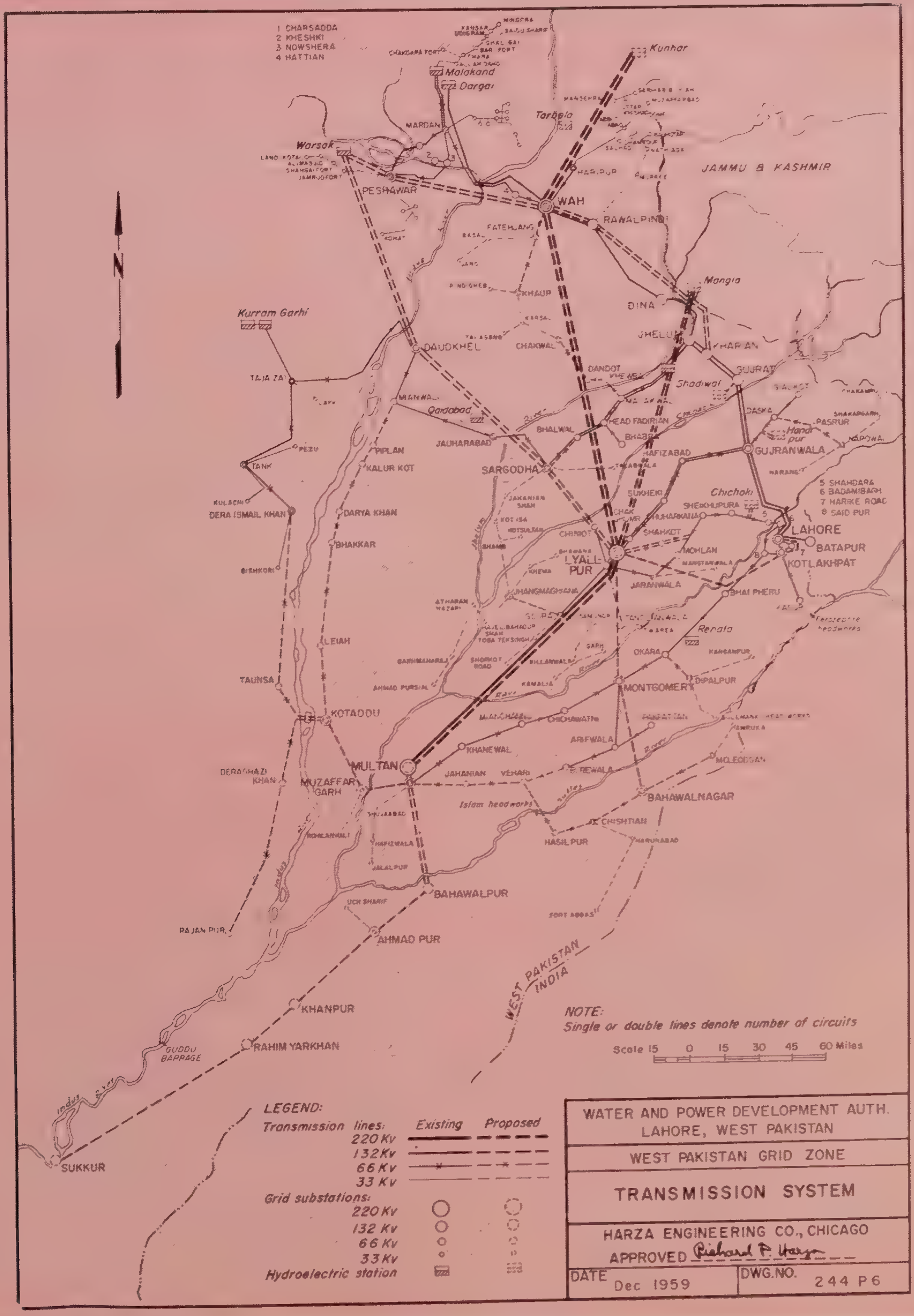
East Pakistan Power Lags

Power development in East Pakistan has been much slower—slower even than planned, for the 80,000-kw Karnafuli Dam's completion was seriously delayed by foundation troubles. Installed capacity in East Pakistan will have increased from 74,000 kw in 1955 to 177,000 kw by the end of June 1960, all of it in thermal and diesel stations. The expected commissioning of the 80,000-kw first phase of the Karnafuli multi-purpose scheme in 1961 and the 36,000-kw Sylet natural-gas thermal station at Fenchuganj the same year will add 116,000 kw to this installed capacity. An additional 40,000 kw is expected to be added to the Karnafuli station before 1965. The I.C.A. had granted $16-million toward the $94.5-million cost of the project and the D.L.F. have provided a $17.5-million loan.

The International Engineering Company are the consulting engineers for this project and Utah International Incorporated are the contractors, both from the U.S.A. A steam power station of 16,400 kw installed capacity is under construction at Khulna and should be completed before June 1960. The generating sets have been contributed by Canada under the Colombo Plan.

A 132-kv double-circuit transmission line is being constructed interconnecting the 10,000-kw Diesel Station at Chittagong with the 18,000-kw Diesel and 30,000-kw Steam Stations at Sidhirganj at a cost of $7.7-million, $5.6-million of which is being provided by the Canadian Government under the Colombo Plan. This will be extended to Karnafuli at an estimated cost of $1.3-million, of which the Government of Canada is providing $1.1-million.

Pakistan's total installed capacity after allowing for the retirement of approximately 142,000 kw on account of the availability of current from the grids, is expected to be 1,272,000 kw by June 1965, 1,091,000 kw of which will be in public utilities and 181,000 kw in industrial establishments. From 110,000 kw in 1948 to 1,272,000 kw well distributed in 1965 is a real achievement for any country—but a still greater achievement when Pakistan's very limited financial resources are considered. Per capita consumption is expected to reach 50 units by 1965.



CUPRO-NICKEL SHEATHING PREVENTS MARINE BORER ATTACK—TRIPLE POLE LIFE EXPECTED

Unique experiment should solve problem of marine borer attack on creosoted pine utility poles in marine locations.

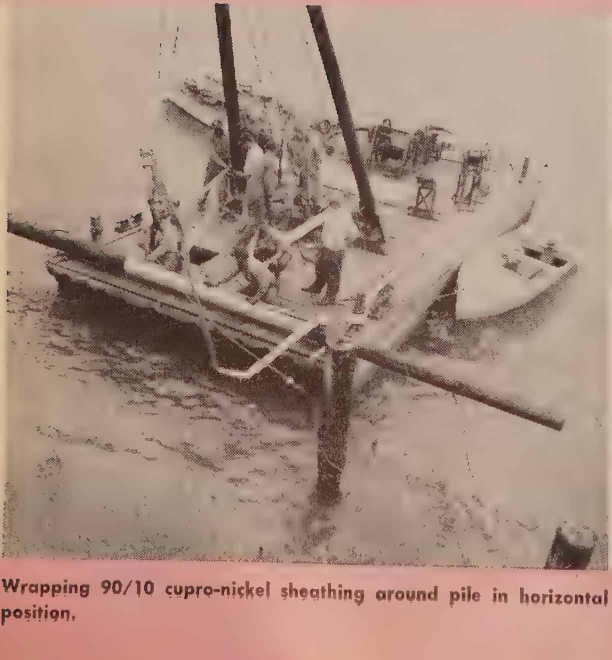
By P. B. ROSS
Wilmington District Engineer
Carolina Power & Light Co.

and D. B. ANDERSON
Kure Beach-Harbor Island Testing Stations
The International Nickel Co., Inc.

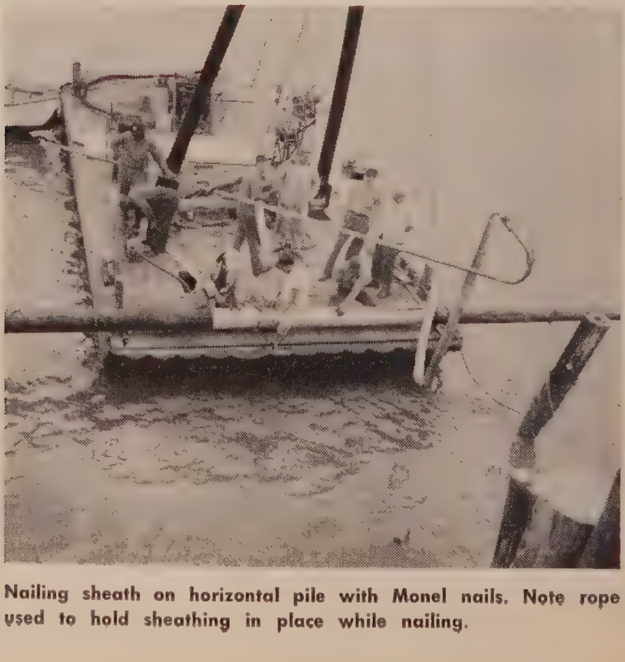
A UNIQUE experiment which should provide Carolina Power and Light Co. with a solution to their perennial problems of destruction of power poles in marine locations due to marine borer attack was initiated during September 1959.

In cooperation with the Harbor Island Laboratory of The International Nickel Company, Inc., at Wrightsville Beach, N. C., three new stub piles were sheathed with 90/10 cupro-nickel prior to driving them in Banks Channel adjacent to the Laboratory. They serve as supports for guy wires to existing utility poles.

It is expected that this sheathing will extend the minimum pole life



Wrapping 90/10 cupro-nickel sheathing around pile in horizontal position.



Nailing sheath on horizontal pile with Monel nails. Note rope used to hold sheathing in place while nailing.

from the present seven to ten years (for creosote-coal-tar-treated power poles in waters along the North Carolina coast) to an estimated 25 to 30 years with a considerable overall saving to the company.

During this seven- to ten-year period, marine borers weaken the poles to an extent that they cannot withstand the high winds that accompany severe storms. Naturally, every effort is made to assure uninterrupted power to the shore communities. And these efforts include frequent replacement of power poles at considerable expense to the company.

Leaching Action

Destruction of treated wooden poles or piles in marine locations begins when the toxicity of the preservative is reduced by the leaching action of the sea water. Even when treated with the best preservatives (coal-tar-creosote solutions), life is seriously limited when used in waters where marine boring organisms are active. In many tropical locations, the effective life of treated wooden piles is less than five years. Poor treatment practices often result in even shorter life.

When treated wooden piles are first exposed in marine locations, the preservative provides positive protection against penetration by marine borers, but with time the preservative is leached from the wood by the sea water and eventually the toxicity of the remaining preservative is reduced sufficiently to permit infestation by marine borer larvae. Eventual destruction of the piling is then only a matter of time.

Mechanical Barriers Tried

There have been numerous attempts to provide a mechanical barrier against preservative leaching and/or marine borer penetration into wooden piles by using metallic or non-metallic sheathing. Plastics and asphalt-impregnated felt lack the strength to resist any mechanical abuse. Metals used for sheathing have included copper, Muntz metal and aluminum. In the past, a technique called "scupper-nailing" was popular and reasonably successful along the southern coast of the United States. This technique consisted of driving a large number of copper nails into untreated piles and was practical due to the cheap labor available.

Past experience with metallic sheathing has demonstrated the need of an inexpensive, corrosion-resistant sheath which can absorb a reasonable amount of mechanical abuse. It has also been shown that the sheathing must extend from below the mud line to above the low tide level. The most aggressive marine borer attack is generally immediately below the low tide level where the oxygen content is highest, but attempts to sheath this area alone have often resulted in severe borer attack immediately below the lower end of the sheath. Other attempts to sheath the entire submerged portions of the piles have generally failed prematurely due to perforation of the sheathing by corrosion, particularly at the mud line.

Untreated Piles

In some instances sheathing has been applied to untreated piles in order to eliminate the cost of pressure treatment with a preservative. Sheathing of this type must be completely water-tight and whenever leakage does occur, either due to corrosion of the sheath or mechanical damage, marine borer attack is no longer inhibited to any appreciable extent, although a metallic sheath formed from a copper-base alloy will supply some protection due to the inherent toxicity of copper. An additional disadvantage of the use of untreated piles is the lack of protection against rot in unsheathed portions.

Pine Used in Test

The Southern yellow pine poles used in this test were 40 ft by 12-in. butt diameter which had been treated with 70/30 creosote-coal-tar solution but had been on hand for two years. Borings from each pole were sent to the U. S. Department of Agriculture, Forest Products Laboratory, Madison, Wisconsin, where the average retension was determined. Four poles were considered adequate for the test—one of them being turned over to INCO for use in their own test which will parallel the C.P.&L. Co. test. The latter pole was cut in half; one section was sheathed with cupro-nickel, while the second section was left unprotected and installed without a sheath. These two piles will be removed periodically for inspection to determine the relative effectiveness of the sheathing.

Cupro-Nickel Chosen

Numerous tests at Harbor Island have demonstrated the exceptional corrosion resistance of 90/10 cupro-nickel to sea water. When continuously exposed to low-velocity sea water, it corrodes at a rate of less than 0.001 in. per year and has excellent resistance to pitting and crevice-type corrosion. Hence, this alloy was selected as ideal for sheathing the test piles.

This sheathing is expected to last at least 20 years before showing any evidence of salt-water corrosion and may last as long as 40 years. The sheath is 79 percent copper, 20 percent nickel and one percent iron.

The sheathing, rectangular in shape, is 40 in. by 10 ft and is 20 mils thick. This size sheet weighs approximately 32 lb. It is obtainable in this width and thickness for lengths in multiples of two ft. The initial cost was $1.80 per lb or $57.60 per sheet. Since the first sheets were ordered, the price has now dropped to one-half the original cost. This price reduction is due to the industry working out a method of joining two pieces, each 20-in. wide, into a single sheet rather than having to make a special run to produce the 40-in. widths.

Installing Sheathing

The sheathing is wrapped around a pile snugly so that it will extend from one ft below the permanent mud line to two ft above mean low tide. The sheathing is then overlapped and fastened in place by 2-in. Monel anchor-fast slating nails, spaced approximately every two in. down the seam and around the top and bottom. When more than one 10-ft section of sheathing is required, the second section is overlapped approximately two in. and nailed in place.

These nails cost approximately $2.50 per lb. They were chosen because of their durability in salt water and creosote and to prevent any galvanic action with the sheath.

No attempt is made to waterproof the sheath. It was felt that any bor-

Completed sheath showing nailed seam.

Sheathed pile ready to be jetted in position. Note power-line pole in background.

Pile sections exposed at INCO Laboratory. Sheathed section is at left—center.

ers which may get between the sheath and pile will die—either from lack of oxygen in the stagnant water, from the high concentration of creosote in this small amount of water, or from the concentration of copper elements in the water due to the presence of the sheath.

The lengths of sheathing were predetermined by sounding the water depth at each location. From previous experience with piling at this location, a penetration of approximately 20 ft could be expected. The sheath lengths on test piles were 10, 11 and 14 ft.

The first piling was started and the sheathing applied with the pile in vertical position. Although the sheathing was applied easily, it was found that a much better job could be accomplished by laying the pile across the deck of the barge, and installing the sheathing while the pile was in a horizontal position.

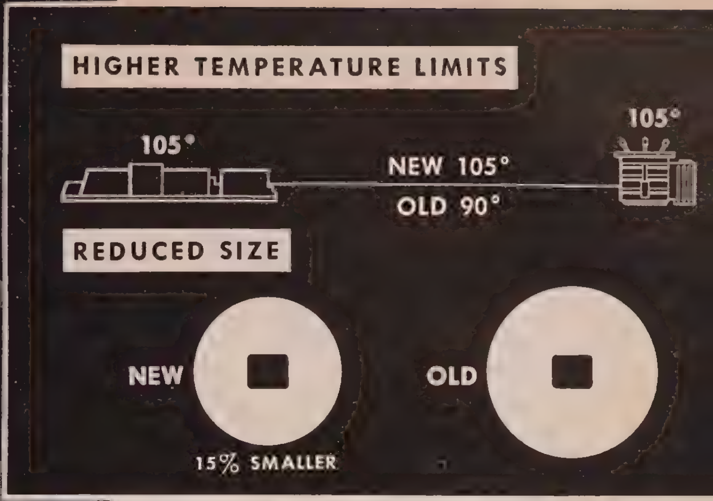
Installing Piling

A large rope was then tied around the butt of the pile and fastened securely to the bitt on the barge to prevent the pile from sliding over the side and scraping the sheath while it was being hoisted in place.

All piles were jetted down, butt first, to the required depth. A tide gauge was used at the Harbor Island Test Station to determine when the proper penetration had been obtained. After obtaining the proper depth, the piles were then raked slightly away from the power line.

Since all of the sheathing was furnished by INCO, the entire cost of this project to C.P.&L. Co. was $808.80. Of this amount, $550 was the labor cost of installing the three piles and their six span guys. The sheathing required approximately three hr to install at a labor cost of $30. Monel nails costing $8 were ordered, but it was necessary to borrow some from INCO to finish the job. The four piles cost C.P.&L. Co. approximately $220.80.

The present life expectancy of these piles is approximately eight years. The average cost to protect them with the sheath based upon the cheaper price was $47, which is 85 percent of the cost of the pile. Thus considerable savings can be realized if this experiment proves as successful as anticipated.



WITH GENERAL ELECTRIC ISOLATED PHASE BUS YOU GET . . .

Higher Temperature Limits— at Reduced Cost

New and tested metallurgical improvements combined with advanced welding techniques now permit the introduction of a 105°C isolated phase bus specifically designed to match turbine-generator and transformer hot-spot operating temperatures.

Upping permissible temperature limits by 15°C reduces bus diameter as much as 15 percent—with a corresponding decrease in cost.

Improved General Electric 105°C bus retains all the original advantages that have always made metal-enclosed duct a superior method of providing conductor support for bus runs. Single-insulator design, reduced maintenance, ability to withstand higher forces, and elimination of condensate problems are basic product benefits.

This new design improvement, a result of intensive fault and heat run testing, is still another contribution from General Electric to help electric utilities reduce their investment per kilowatt hour of operation. For more information, contact your nearest G-E Apparatus Sales Office, or write to Section 496-9, General Electric Company, Schenectady 5, N. Y., for Bulletin GEA-6874.

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MANUFACTURERS/PRODUCTS

Data From Vallecitos

EBWR Maintenance Poses No Radioactivity Problem

Radioactivity will not be a serious problem in the maintenance of boiling water reactors, according to indications observed by General Electric personnel during the recent conversion program at the Vallecitos Atomic Power Plant. Experience gained during the modification program for the VBWR—one of the few times a power reactor has been torn down after lengthy operation—indicated the radiation levels in the reactor building, except in the area formerly occupied by the reactor core itself, were sufficiently low to permit modification crews to work full shifts with easily controlled safety precautions.

The reactor recently went critical again after being down since October 1, 1959, for a scheduled $1-million modification. It is now operating with a core mainly composed of fuel assemblies for several AEC programs.

VBWR originally was designed to develop data for application in the design of the recently completed Dresden Nuclear Power Station and other developmental programs. The company-financed modifications were taken to permit the reactor to be used for advanced experimental programs relating to other nuclear power plants and to general technological development of nuclear power.

Major changes to the reactor were a new core structure and installation of two high-head pumps to increase circulation rate of the cooling water. The two high-head pumps, which replaced a single low-head pump, double the circulation rate and permit testing of higher specific power fuels.

The new core structure permits better steam-water separation, and allows a higher percentage of the cooling water to pass through the fuel elements. It also broadens the performance limits of the reactor when employing internal natural circulation, forced circulation, or single- or double-cycle operation.

These two changes give GE engineers the capability to stimulate the characteristics of a large power reactor from the operation of a relatively small, compact core.

Flat Fluorescent Lamp Introduced

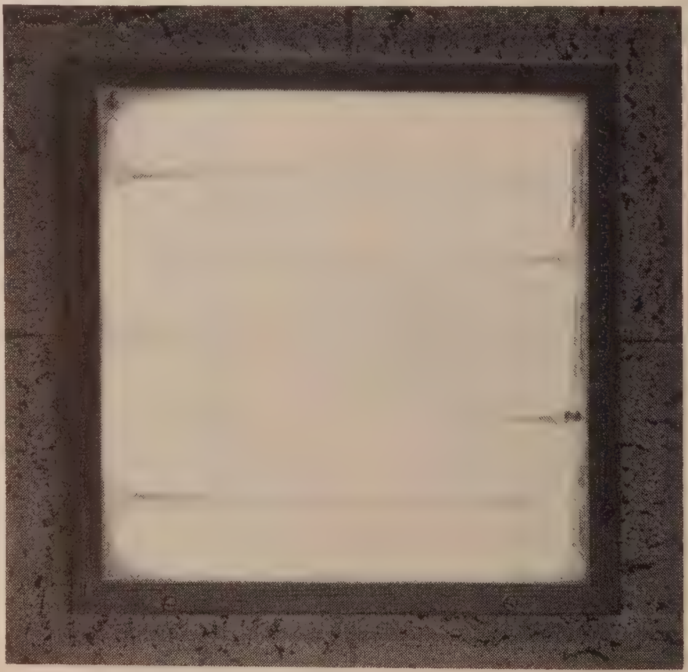
A radical departure from the standard tube-type fluorescent lamp has been introduced by Westinghouse Electric Corp. The new lamp, in flat, thin, rectangular shapes has passed the prototype stage and will go into production as soon as mass-production equipment can be completed.

The unusual design, less than an inch and a half thick, and 12-inches square, utilizes a labyrinth or maze of passages sealed in a thin glass block. The 12-inch models will be 40 to 50-watt lamps. They will produce considerably more light than a 100-watt incandescent bulb.

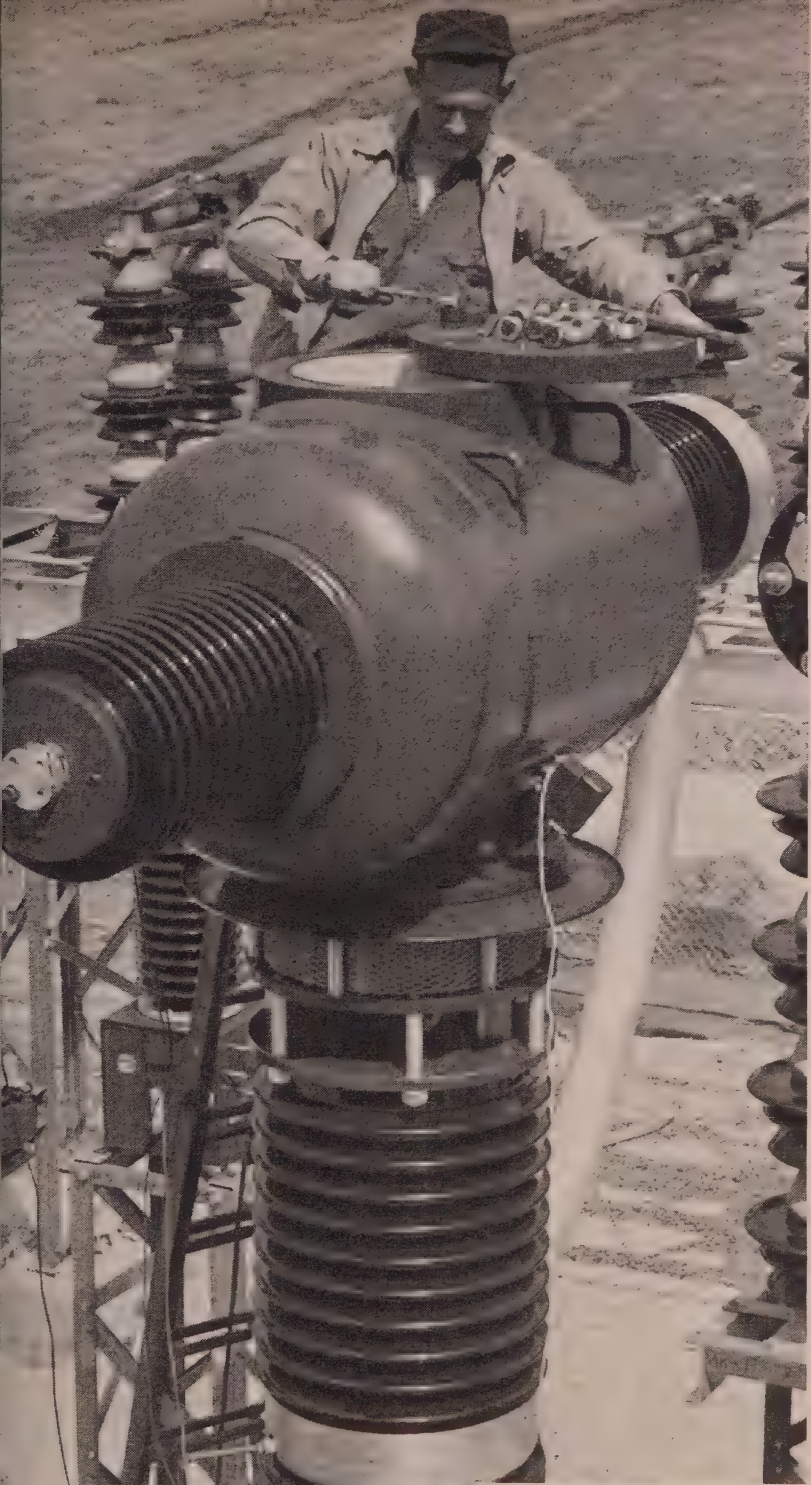
Initially, the production model will have a reflective surface on one side so that all light will be directed. Patterned glass will be utilized to control brightness and direction of the light and to produce a pleasing decorative effect.

According to Charles E. Erb, general manager of the large lamp department, the lamps may be installed in modular fashion, similar to glass brick or ceiling tile, to form blocks of light in walls and ceilings. Initially, Mr. Erb foresees extensive application in residential and commercial buildings for such functions as shelf lighting, kitchen, bathroom, and hall illumination, and for unusual effects in reception rooms,

(Continued on page 92)



Electric discharge travels a winding path through the labyrinth passages of this new fluorescent lamp by Westinghouse, producing a large-area source of light. The 12 x 12 x 1½-in model shown above will be 40-50 watts, giving off considerably more light than a conventional 100-watt incandescent bulb.



GENERAL ELECTRIC'S AIR-BLAST DESIGN PROVIDES . . .

Drastically Reduced Maintenance For Power Circuit Breakers

General Electric air-blast power circuit breakers require maintenance only one-third as often as conventional breakers. And when they do, maintenance crews can complete their work in less than one-fourth the time.

Maintenance requirements are reduced because the fast interrupting action of G-E air-blast breakers greatly reduces erosion of contacts, probes, and orifices. Fast interruption occurs because high-pressure is stored in the interrupter head, and is available the instant contacts part.

Normal inspection is simple and fast. It involves exhausting stored air from the breaker, swinging the interrupter access cover aside, and visually inspecting the contacts. If required, the complete operating mechanism can be replaced quickly with a spare unit.

In addition, G-E air-blast breakers can be installed in a fraction of the time normally required to install comparable oil breakers, and provide practical protection for transmission systems 115 to 460 kv and higher.

Why settle for less? Contact your G-E Sales Engineer for more information. Or write to Section 494-06, General Electric Company, Schenectady 5, N. Y.

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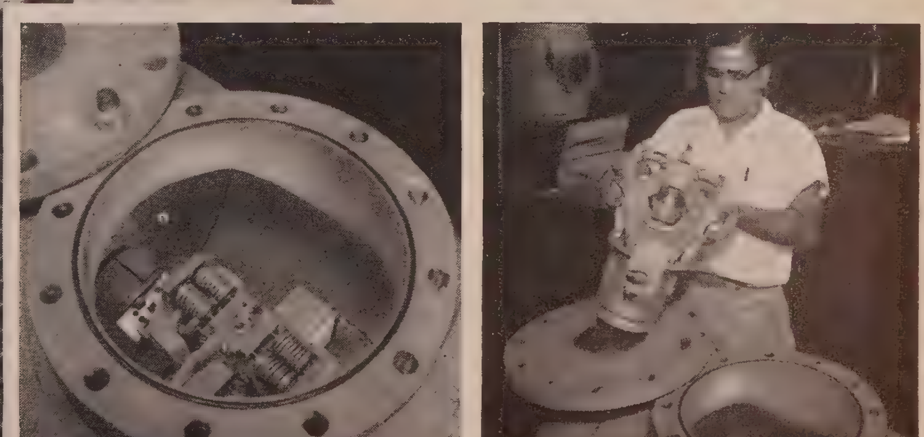

CONTACTS ARE VISIBLE for inspection without removing any parts. If required, the entire operating mechanism can be removed and quickly replaced with a spare unit.

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"Superforms* sure fill the bill for a STANDARDS ENGINEER!"

"Fanner Superformed products meet our standards all along the line . . . *technical superiority, accurate manufacture, uniform quality, dependable performance.*"

More and more Standards Engineers . . . *the men who must find BETTER ways to do things BETTER* . . . are testifying that Superforms meet the highest standards.

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ARMOR RODS . . .
Protect long-span T&D lines at supports

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PATCH RODS . . .
Repair damaged conductors

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FANNGRIPS . . .
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FANNSPLICES . . .
Join two ends of conductor wire

PLASTIC PRODUCTS . . .
For conductor surface protection

FANNER
The Fanner Manufacturing Co.
Brookside Park—Cleveland 9, Ohio
Division of Textron, Inc.

Flat Fluorescent . . . *from p. 90*

offices and display rooms. Eventually, some models may be made of heavy, shock-resistant glass, raising the possibility of using the new type lamp in roadways, landing strips, and other similar installations.

Because they require only a skeleton fixture with practically no depth, the lamp can drastically reduce the amount of ceiling space required to mount the lamps. This means that a multi-story building, for instance, need not be quite so tall, resulting in substantial savings to the builder.

Maintenance costs should also be reduced with the new design. Only the outer surface of the lamp need be cleaned with a damp cloth, instead of having to clean fluorescent tube, reflector, and diffusing elements of a standard fixture.

Market availability of the new lamp has not yet been announced.

New Reliability With Electronic Scanning

A solid-state "Electronics Scanning System" by Lynch Communication Systems, Inc., provides a new concept of reliability for performing monitoring, alarm and remote station on-off control functions from a central station, according to Donald E. Campbell, president of company.

Designated the Lynch B-1000 series, the new systems utilize solid state circuitry throughout, providing continuous scanning of all functions by purely electronic means, using no relays or stepping switches, and no motor driven commutators or rotating switches.

The systems employ a form of time-division-multiplexing which codes each function: go-no-go, start-stop, on-off, and repeats it continuously at rates up to 3000 bits per second. Standard equipment provides up to 36 separate functions which may be transmitted over a single pair of wires on a DC or tone channel basis, wire line or microwave channel. System will scan and control up to 36 separate functions in a time cycle as short as ¾ of a second and can be set to operate on a predetermined basis for one or more functions in any order desired.

Closeup of receiver cabinet shows banks of identical-size plug in modules. Each module is slot coded, cannot be accidentally replaced in an incorrect position.

According to Mr. Campbell, the system has far greater speed and reliability of operation than present day "primitive" electro-mechanical systems utilizing relay switches.

The system is modular in design so that if additional functions are required for monitoring, supervision, or control, a series of systems may be installed.

A-C Unveils New Substation Planning Concept

Allis-Chalmers has introduced a new economical approach to substation planning called Regu/Tran, said to provide improved service, maximum flexibility and safety, and minimum maintenance.

The compact, Regu/Tran assembly consists of three single phase regulators directly mounted on a three-phase power transformer with a by-pass switch located above each regulator.

The simplified arrangement gives single-phase regulation with three-phase unit assembly. As a result, the Regu/Tran unit conserves valuable substation space by requiring only one low-cost concrete pad for mounting the entire assembly. In addition,

(Continued on page 94)

CO-ORDINATED DESIGN,
MANUFACTURE AND
SHIPMENT MEAN YOU CAN . . .

Cut Installation Time and Costs With General Electric Outdoor Stations

You can reduce installation time, cost and worry when you buy a complete outdoor station from General Electric. Here's why:

- **There are no "bottleneck"** parts to wait for, and no "forgotten" items. Components are either in stock, or can be manufactured repetitively to meet your exact specifications.
- **Components are shipped** to coincide with your construction schedule. "Piecemeal" shipments are avoided.
- **All electrical and structural items** are co-ordinated mechanically and electrically because you are purchasing from one manufacturer.

To meet your individual requirements, you have a choice of lattice-work structures or rolled-shape columns of aluminum or galvanized steel.

Why settle for less? For more information, contact your G-E Sales Engineer. Or write to Section 495-12, General Electric Co., Schenectady 5, N. Y.

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LATTICE-TYPE ALUMINUM STRUCTURE used for station illustrated is light enough to be handled manually. Station structure was erected in one working day.

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Still setting quality standards . . . since 1952 . . . and additional benefits have been enjoyed from other BODENDIECK developments:

- FAST ACTING SPIN-TITE CHAIN BINDERS ON POLE MOUNTING EQUIPMENT
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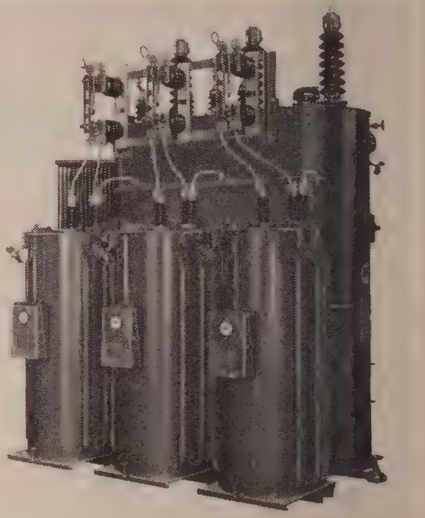
BODENDIECK
TOOL CO., / TAYLORVILLE, ILLINOIS

A-C . . . *from p. 92*

it offers flexibility through single-phase regulation to substations having outgoing feeder handling single-phase loads on all three phases.



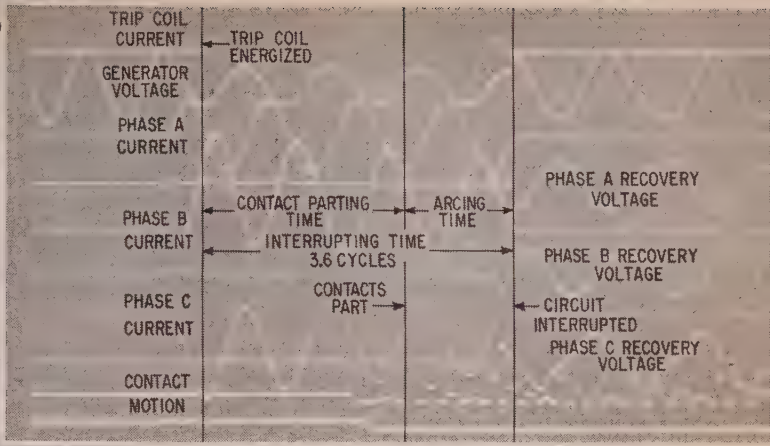
The unit is available fully assembled or as individual components for field assembly in hard-to-reach locations. This permits installation in locations where integral tap-changing equipment cannot be considered due to its size and weight.

According to the manufacturer, maximum flexibility is assured since at any time transformer, regulators, and by-pass switches can be used independently at separate locations if desired.

First 500-kva Pole-Type Distribution Transformers Shipped

Three 500-kva distribution transformers designed by the Westinghouse Electric Corporation have been shipped to Houston Lighting and Power Company to serve the Northline Shopping Center in Houston, Tex.

An extension of the higher kva line of distribution transformers, these are the first pole-type units of this rating to be shipped in this country. The transformers will be installed on a rack to avoid the expense of constructing a ground-type substation. These new 500-kva transformers were designed to provide lower electrical losses which will result in a definite operating cost advantage over the older substation design.



Five-cycle performance of G-E one-tank sub-transmission breakers is demonstrated in the oscillogram above. Conventional breakers are rated to interrupt in eight cycles. Photo shows one of 17 G-E one-tank breakers installed by The Potomac Edison Company, Hagerstown, Md.

WITH GENERAL ELECTRIC ONE-TANK SUB-TRANSMISSION BREAKERS, YOU CAN . . .

Cut Interruption Time to Five Cycles

Five-cycle performance of General Electric's one-tank sub-transmission breakers (15 kv through 46 kv) provides superior system protection. This is a full three cycles faster than industry requirements for breakers of this class. Here's what quicker interruption means to you:

- Chances of line burn-down are reduced;
- Inspections and maintenance can be reduced, because oil carbonization and contact wear are minimized.

Five-cycle interruption is possible because of the interrupter efficiency and compactness of the G-E one-tank breaker. Since linkages are shorter and lighter, contacts part in 2½ cycles or less. Field-proven oil-blast interrupters also help decrease interrupting time.

Why settle for less? For more information, contact your G-E Sales Engineer. Or write to Section 494-01, General Electric Co., Schenectady 5, N. Y.

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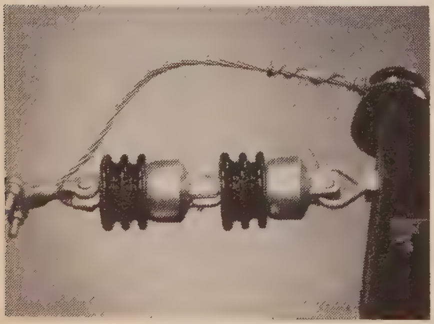
NEW PRODUCT DESIGN

600-Volt Potential Transformers Available

A 600-volt, butyl-molded potential transformer, designed to meet the specific needs of electric utilities is available from **General Electric**. Designated Type JVP-O, the new indoor-outdoor potential transformer is designed for single or multiple metering applications. The ASA accuracy classification is 0.3 W and X. Impulse level is 10 kv full wave. The JVP-O is available either unfused for outdoor application or with one or two primary fuses for indoor use. The units are about 20 percent smaller and lighter than comparable models. The JVP-O has provision for sealing secondary terminal cover. Ratings are 240:120, 288:120, 300:120, 480:-120, and 600:120. Outdoor model has heavy stainless steel base with key and slotted holes to provide maximum mounting flexibility. Provision has also been made for secondary conduit box on the outdoor model.

Circle item #27 on reply card



Deadend Insulator

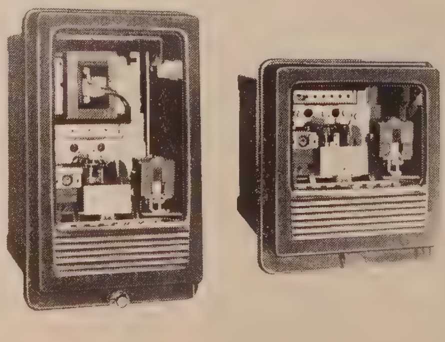
A distribution deadend insulator that features all-aluminum hardware is being marketed by A. B. Chance Co. The forged aluminum cap and stud greatly increase service life in corrosive atmospheres and make total weight 30 percent lighter than standard insulators. New porcelain shell contour has higher impact strength and improves the appearance of distribution construction.

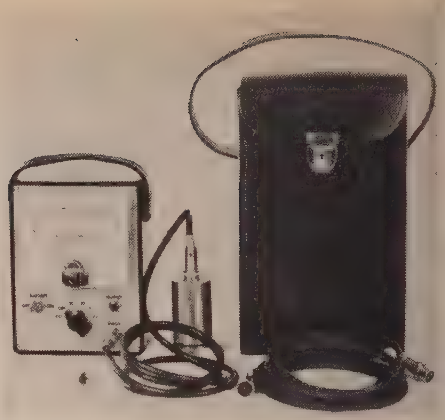
Circle item #28 on reply card

Power Relays

Type CW power relays by **Westinghouse** detect excessive or reverse power flow for single- or three-phase applications. Both CW relays are self contained, requiring no external reactors, and are available for 120- or 208-volt systems. One relay is needed for balanced three-phase systems and three are needed when unbalanced three-phase conditions exist. Tap block indicates watt values. Units have adjustable time delay.

Circle item #29 on reply card

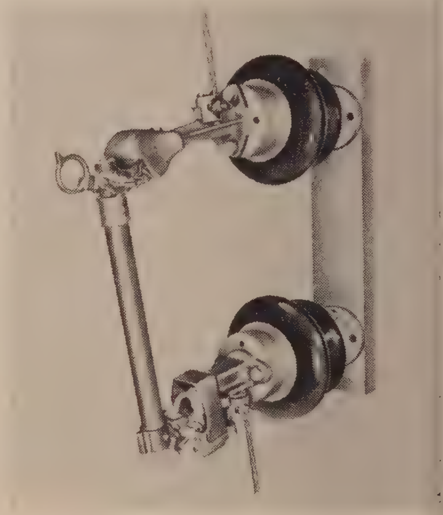




Vibration Meter

Vibration Engineering and Balancing Service has introduced a portable vibration meter built in a standard meter case, with a detachable cord for the vibration pickup. Transistorized circuits provide long, rugged life, and high degree of accuracy. Meter seldom requires re-calibration. Battery voltage is not critical and can drop 20 percent with only a 5 percent drop in readings.

Circle item #30 on reply card



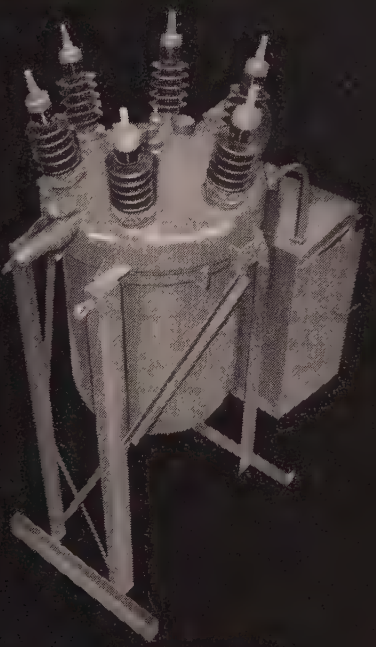
Power Fuse

A. B. Chance Co. is manufacturing a power fuse that employs the design of Chance Open-Type Cutouts. Circuits are cleared without pitting or burning of contacts. Silvered for cool operation, the contacts are held under high pressure and are self-wiping. The Type P fuse is available in 7.5, 15, and 23 kv ratings, 100 and 200 amp continuous current ratings, 4000-10,-000 amps interrupting capacity.

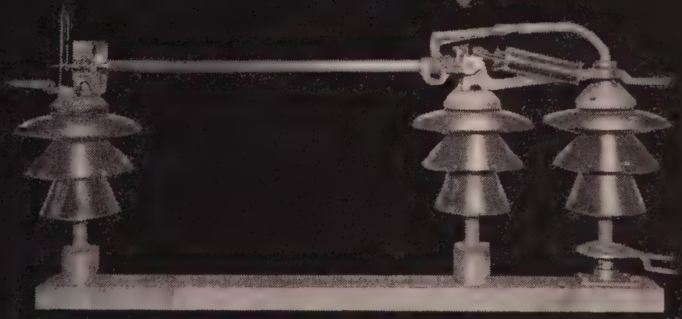
Circle item #31 on reply card

Single column of Type ATB air-blast power circuit breakers—115-460 kv.

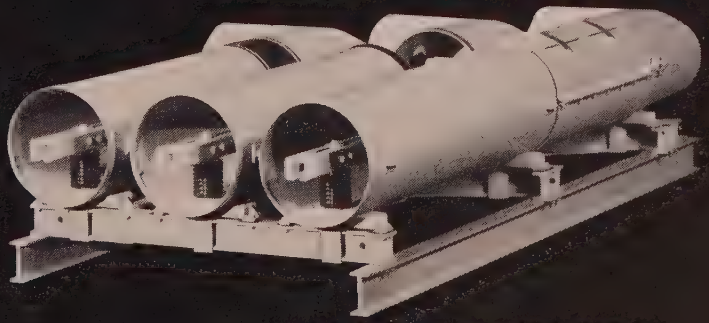
Completely designed and coordinated outdoor stations—7.5-230 kv.



Single-tank sub-transmission breakers—14.4-46 kv.



Disconnect switches—7.5-345 kv.



Isolated phase bus—14.4-34.5 kv, through 20,000 amps.

GENERAL ELECTRIC OFFERS YOU A COMPLETE LINE OF HIGH-VOLTAGE SWITCHGEAR . . . . .

Why Settle for Less?

When you buy General Electric generation and transmission switchgear, you get one all-important benefit no other manufacturer can match—*outstanding added value.*

You Get Top Product Design—From giant 460-kv air-blast breakers to custom-tailored outdoor stations, General Electric high-voltage switchgear equipment is designed for easiest installation, top safety, optimum performance, and dollar-saving ease of maintenance.

You Get Results of Research—Important General Electric developments in the high-voltage switchgear field include:

- First single-tank, five-cycle outdoor sub-transmission breaker;
- First modern air-blast transmission breaker;
- First isolated-phase bus with conductors having a 105°C maximum hot-spot temperature.
- First computer-designed outdoor station.

You Get Nation-wide Service—G-E sales offices and service centers throughout the nation assure you of prompt, courteous application and installation assistance; also, fast, high-quality maintenance and repair service.

Why Settle for Less? Whether you want one disconnect switch, or a complete, custom-tailored switching station, with General Electric you get the *best* in switchgear. For information on specific equipments, contact your G-E sales engineer. Or send in the coupon below.

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General Electric Co.
Section L492-13
Schenectady 5, N. Y.

Send me detailed information on the following:

☐ High-voltage air-blast breakers
☐ Disconnect switches
☐ One-tank sub-transmission breakers
☐ Isolated phase bus
☐ Outdoor stations 7.5 to 345 kv

OTHER: ____________________

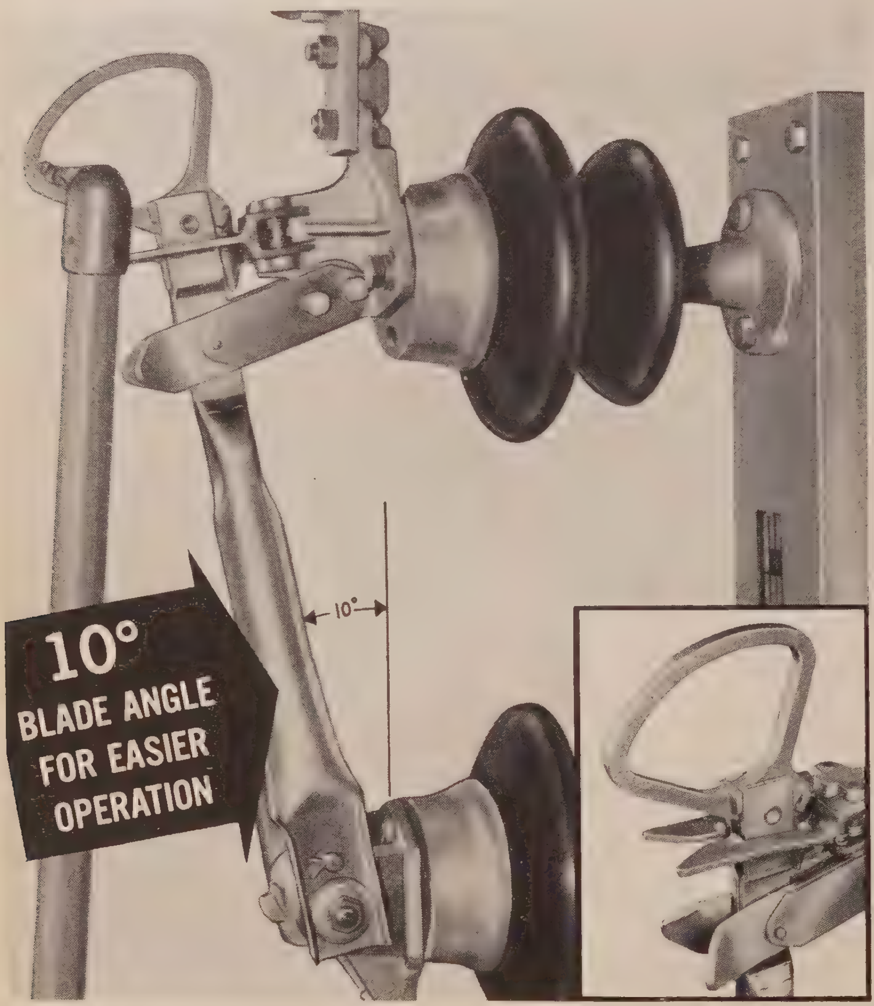
NAME ____________________ TITLE ____________

COMPANY ____________________

ADDRESS ____________________

CITY ____________________ STATE ____________

NEW Delta-Star B-2L Hook Stick Switch



The simpler, stronger design of the new Delta-Star B-2L Hook Stick Switch makes it the most reliable isolating switch on the market. New contact and hinge design minimizes current interchange surfaces, and provides lateral latching. Blade is rigid-formed hard-drawn copper tubing. Copper shoes have silver inlays for silver-to-copper contacts.

Operation of the new B-2L is easier—too. The 10° blade angle makes it easier to pull the blade —especially when the operator is directly under the switch.

Additional new features include the hook ring design, which positions the hook stick, and integral terminal clamps for ¾″ IPS and 500 MCM cable, plus NEMA standard drilling for lugs.

For full information on the new Delta-Star B-2L Hook Stick Switch, which meets NEMA and AIEE standards, consult your Delta-Star representative or write to *Delta-Star Electric Division, H. K. Porter Company, Inc., 2437 Fulton St., Chicago 12, Illinois.*

DELTA-STAR PORTER ELECTRIC DIVISION

H. K. PORTER COMPANY, INC.

PORTER SERVES INDUSTRY with steel, rubber and friction products, asbestos textiles, high voltage electrical equipment, electrical wire and cable, wiring systems, motors, fans, blowers, specialty alloys, paints, refractories, tools, forgings and pipe fittings, roll formings and stampings, wire rope and strand.

Lineman's Safety Knife

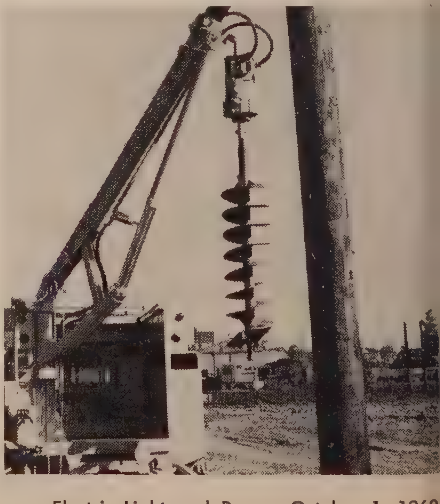
The Krause Lineman's Skinning Knife was designed to take the place of the standard linoleum knife used by linemen for skinning conductor. The hooked blade must be retracted before it can be clipped to the lineman's belt. Unit is encased in a strong plastic handle and blades can be replaced easily when necessary. Available from **Arch T. Flower Co.**

Circle item #32 on reply card

Power Derrick

A corner-mounted power-derrick —designed especially for working in narrow streets, alleys and congested areas—is being manufactured by **Holan Corp.** Engineered as a complete unit to avoid body and derrick stresses, it has a horizontal sweep of 110° to permit boring and pole-setting behind and to the side of the truck. Holes up to 30 in. diameter and 8 ft deep can be bored without extensions. Model 7500 is mounted on the left side of the truck, but right hand mounting is also available.

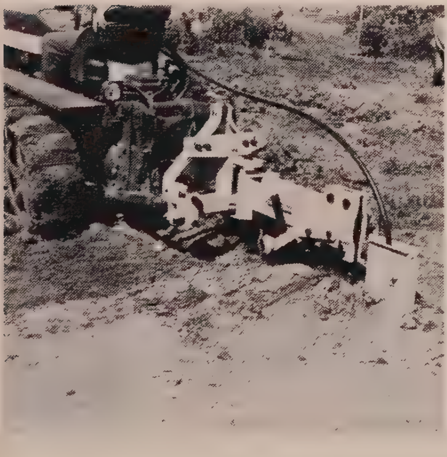
Circle item #33 on reply card



Primary Voltage Ammeter

An inverted housing for Max-I-Meter primary voltage ammeters allows readings to be made accurately from ground level. Device simplifies and speeds up the process of taking primary readings and allows the operator to stay out of the primary voltage area. The inverted housing feature is available on virtually all Max-I-Meter models from the manufacturer, **HD Electric Co.**

Circle item #34 on reply card



Cable Layer

A direct connected, pivoted cable layer, by **International Harvester Co.**, is available with a variety of hitch options to fit wheel or crawler tractors. Designed for rugged use, the No. 2 cable layer has a subsoil standard of 1x8 in. heat treated steel. Unit has a pivoting rear frame that enables the operator to make tight turns. All types of cable, plastic tubing or copper pipe can be laid without damage.

Circle item #35 on reply card

Improved Arrester

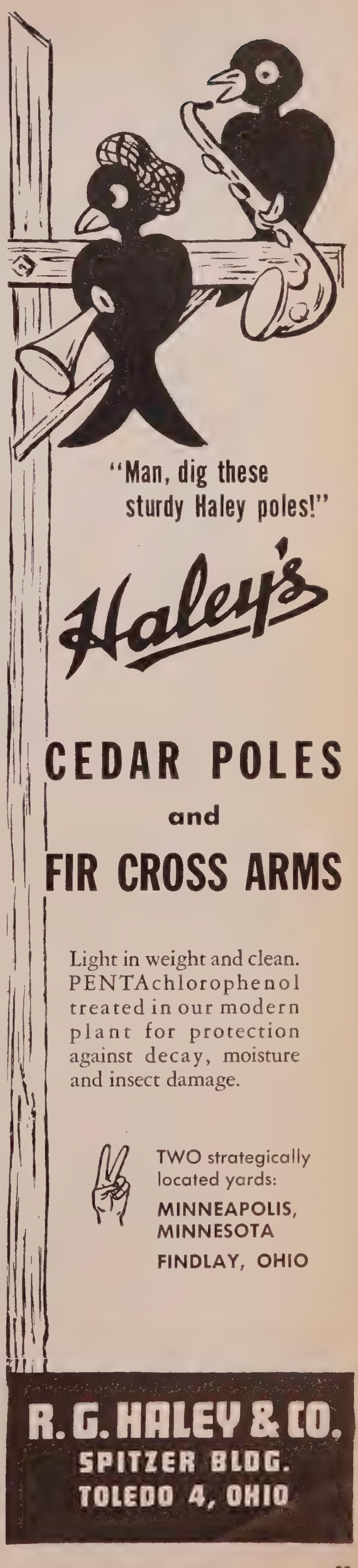
A shorter, lighter, yet more efficient lightning arrester by **Delta Star Electric** division of H. K. Porter Co., Inc. has a discharge voltage (in the 9 kv range) 20 percent lower. It is four inches shorter and 20 percent lighter than the model it replaces. Long leakage and the same safety factor are retained. The Type DS Crystal Valve Lightning Arrester also saves 30 percent on storage space.

Circle item #36 on reply card

Pick-Up Assembly

A pick-up assembly comprised of an induction coil enclosed in a post type insulator is designed so that a conductor resting on top of the insulator causes a proportional voltage to be induced in the coil. Unit may be used for capacitor switching based on phase angle, current or both; load limit tripping, checking or warning, power direction sensing and line current measurement. Requires no line break-in or dead ending. By **Fisher-Pierce.**

Circle item #37 on reply card



"Man, dig these
sturdy Haley poles!"

Haley's

CEDAR POLES
and
FIR CROSS ARMS

Light in weight and clean.
PENTAchlorophenol
treated in our modern
plant for protection
against decay, moisture
and insect damage.

TWO strategically
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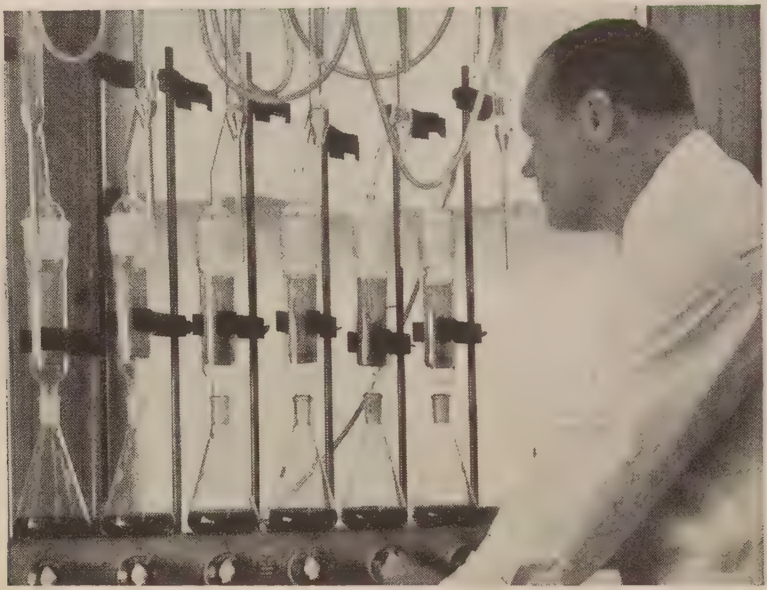
FINDLAY, OHIO

R. G. HALEY & CO.
SPITZER BLDG.
TOLEDO 4, OHIO

TECHNICAL BRIEF NO. 60-1

By D. L. DAVIES, *Manager, Technical Dept.*
Wood Preserving Div., Koppers Company, Inc.

USE OF THE ASSAY METHOD TO DETERMINE RETENTION IN POLES



PRESENT STATUS

The Assay Method of determining preservative retention in pole charges has been described in Koppers Technical Bulletins W-101 and W-102. Following is the status of the Assay Method as a replacement for the less accurate gauge method of determining preservative retention.

The Western Electric Company, Inc. over 2 years ago made the Assay Method a part of its specifications on all new pole contracts. This major specification change was adopted to eliminate "weak sister" charges — charges which meet standard specifications by other measurement tools, but which in reality do not contain sufficient preservative to provide long-lasting protection.

The Rural Electrification Administration in April, 1960 issued new specifications which make mandatory that determination of retention in poles be made by the Assay Method. Many REA utilities have suffered financial loss from premature pole failures. They, too, want to eliminate the "weak sisters".

The Federal Government has a tentative specification TT-W-571f, now being reviewed by industry, which also calls for the Assay Method for determining retention (without alternates) in both poles and piles.

The AWPA adopted the Assay Method for determining retention in poles as a "full standard" at the April 24-26, 1960 meeting.

HOW TO APPLY THE ASSAY METHOD

In applying the Assay Method to poles, the specifications require that the outside ½" of the pole section be discarded. This section usually contains about 14-lb. preservative per cubic foot. Specifications further require that the next 1½" be assayed for retention. Therefore, an 8-lb. normal gauge retention charge must have a minimum of 6-lbs. per cubic foot in this zone. A 10-lb. treatment must have 7½ lbs. and a 12-lb. treatment must have 9-lb. in the assayed zone. No undertreatment allowance is permitted. Adoption of these retention requirements represents the most significant advance in standards for pine pole treatment since the adoption of 2½" or 85% sapwood penetration requirement in the late 1930's.

ANY COMPANY CAN ADOPT THE ASSAY METHOD

The status of the Assay Method for determining retention has advanced to the stage that any company can adopt it by a simple notation on the purchase order specifying that "poles are to be treated to a retention of *x* pounds/cubic foot as determined by assay".

• • • • • • • • • • •

For the full report on using the Assay Method, or answers to technical questions on poles or pole treatment, write: Koppers Company, Inc., Wood Preserving Division, Technical Dept., Room 742 Koppers Building, Pittsburgh 19, Pa.

C-45

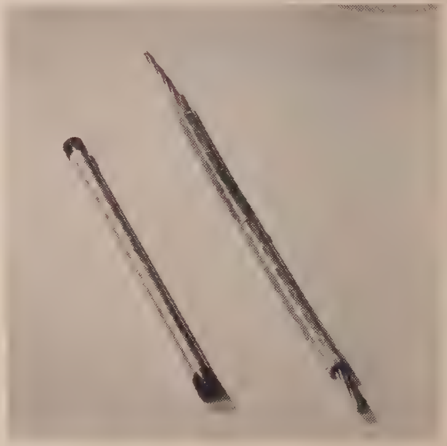
KOPPERS ®

KOPPERS
PRESSURE-TREATED WOOD

Aluminum Connector

Jiffy Joint, a single aluminum sleeve for joining ACSR and aluminum alloy conductors, has been announced by **Alcoa's Rome Cable division.** The single sleeve joint develops the full electrical and mechanical properties of the composite joint it replaces. Jiffy Joint is available in sizes to join conductors from No. 4 (6/1 stranding) through 477 MCM (18/1 stranding).

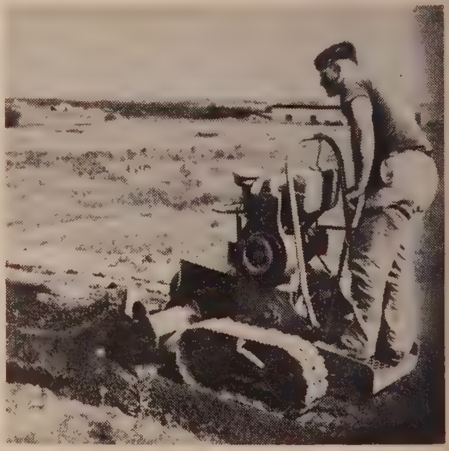
Circle item #38 on reply card



Crawler Mounted Trencher

Introduction of crawler mounted Ditch Witch trenchers has been announced by **The Charles Machine Works, Inc.** It is available in all series M machines in either nine or twelve h.p. models. Units are self-propelled and are equipped with a steering device. Also available is a conversion kit to adapt any '59 or '60 model M-3 for crawler mounting. Unit has proven especially adaptable in frost conditions and rocky soil.

Circle item #39 on reply card



SUPPLY FACILITIES

GE To Study Advanced Manufacturing Methods

Plans for the construction of a $3-million laboratory for the study of advanced manufacturing methods were announced recently by H. B. Miller, General Electric vice president of manufacturing services.

The new facility will consolidate in one location six manufacturing services components now operating at various locations in Schenectady. Construction is scheduled to begin in early 1961 and is due to be completed later in the year.

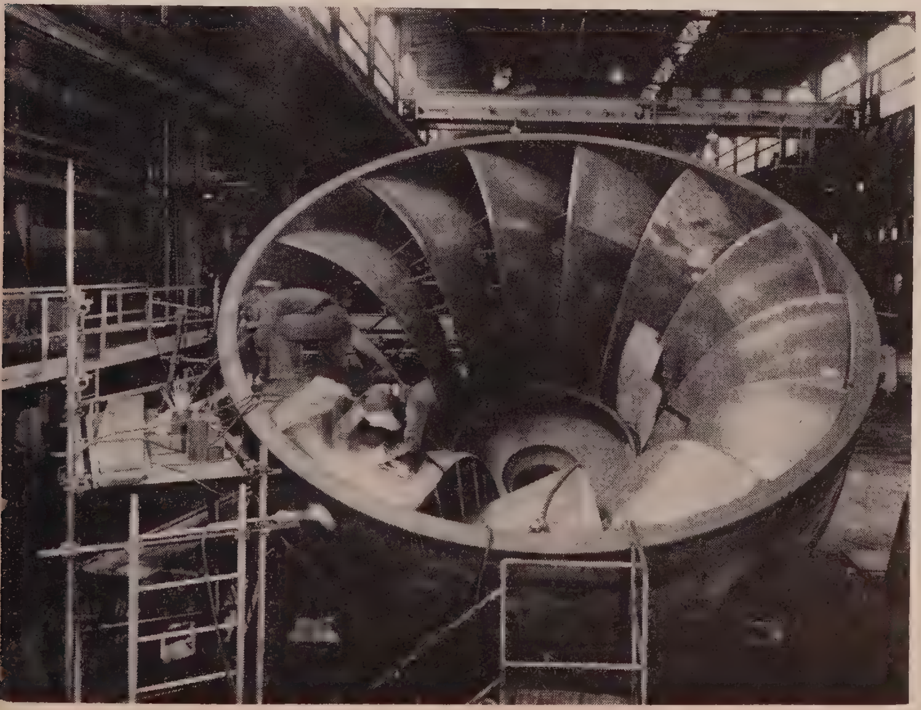
Purpose of the lab is to provide the company with the tools necessary to maintain product leadership while holding costs down, according to Mr. Miller.

"The answer to foreign competition is not in reducing American living standards, but in improving our productivity and our products," he said. "And that's exactly what laboratories like this are set up to do."

The scope of the lab's activities will be in the areas of research and development, teaching and counseling, and dissemination of data on manufacturing methods. The original manufacturing laboratory was first established in 1952 and since has been responsible for a number of advanced concepts in manufacturing.

The new structure will contain some 170,000 sq ft of floor space. It will house offices, laboratory facilities, shops, classrooms and auditorium.

First of seven hydraulic turbine runners for the Oahe Reservoir project is seen under fabrication by Allis-Chalmers Manufacturing Co. Cast steel blades are welded to the rolled steel band and cast steel crown. Preheating torches are used to reduce distortion and improve the weldment. Critical areas on back surface of each blade have been overlaid with stainless steel to reduce pitting during operation. All seven units, each rated 128,500 hp at 100 rpm under 185-ft. head, will be installed by Allis-Chalmers. Measuring 218 in. OD, this 90-ton runner will be shipped on a 100-ton deep-well railroad flat car at the end of February 1961. Oahe dam, 242 ft. high with a crest length of 9,300 ft. is on the Missouri River six miles northwest of Pierre, S. D., and represents the second largest earth-filled dam in the United States.



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"Superformed* spells S-A-F-E-T-Y to a SAFETY SUPERVISOR"

"We Safety Men must look at any piece of equipment from the *safety* angle.

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Everywhere, Safety Engineers, *the men who guard the safety of people*, have a good word for Superforms.

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FANNER *Superformed** with a **"PROTECTIVE TWIST"**

ARMOR RODS . . . Protect long-span T&D lines at supports

LINEGUARDS . . . Protect short-span T&D lines at supports

PATCH RODS . . . Repair damaged conductors

TAP ARMOR . . . Protects conductor at tapping points

FANNGRIPS . . . For dead-ending strands and conductors

FANNSPLICES . . . Join two ends of conductor wire

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RED CEDAR POLES

They're Safe, Clean to Climb and Deliver Many Added Years of Trouble-free Service

LIFE-SPAN Western Red Cedar Poles are clean and protected from top-to-butt. They are the result of years of continuous research and are **completely** immune to decay. To serve the utility industry better, Page & Hill maintains three mechanized yards with modern handling equipment. The LIFE-SPAN treatment applied to P&H poles complies with all approved E.E.I. or A.W.P.A. Thermal specifications.

When you buy—specify LIFE-SPAN Western Red Cedar Poles! They're your assurance of longer pole-line service at far less per annum cost.

PAGE & HILL, Inc.
MINNEAPOLIS 3, MINNESOTA

Microwave Communication Symposium To Tour U. S.

A nation-wide tour has been announced for a microwave and carrier communication system engineering symposium and exhibit sponsored by the Texas division of Collins Radio Co.

Purpose of the symposium, which will be held in 19 cities, coast-to-coast, is to acquaint management and communication personnel in industrial and government circles with the engineering parameters and application techniques of microwave and carrier equipment.

Symposium topics will include: an introduction to microwave techniques, path consideration, path engineering criteria, preliminary design factors, legal requirements, RF applications and techniques, carrier (multiplex) design, powering variations, compatibility, and theory of operation vs design parameters.

Two terminals of operating microwave and carrier equipment will be demonstrated, utilizing 12 multiplex channels (part of a 240 channel system) operated at 24 v and 130 v d-c.

Cities and dates of appearance include: Omaha, Neb., Oct. 10-14; Atlanta, Ga., Oct. 24-28; New York, N. Y., Nov. 7-11; Minneapolis, Minn., Nov. 21-25; Denver, Colo., Nov. 28-Dec. 2; Seattle, Wash., Dec. 12-18; Helena, Mont., Jan. 9-13; Portland, Ore., Jan. 23-27; San Francisco, Calif., Feb. 6-10; Los Angeles, Calif., Feb. 20-24; Albuquerque, N. M., Mar. 6-10; New Orleans, La., March 20-24; Jacksonville, Fla., Apr. 3-7; and Charlotte, N. C., April 17-21.

Chicago To Get Full-Scale EDP Center

The first full-range completely transistorized electronic data processing center to serve the business community of Chicago will be opened in the early fall by RCA. The center will be the fourth in a network being created by RCA to solve the mounting paperwork problems in today's business world. Ultimately, the Chicago center may be connected to others in the network by the DaSpan transmission system, and to clients directly.

MEN OF POWER

Avila To Head Boston Edison Company

Charles F. Avila has been elected president of Boston Edison Co., largest operating utility in New England. He succeeds the late Thomas G. Dignan, who died suddenly at the executive offices of the company on July 29.

Charles F. Avila

Prior to his election to the top post in the utility, Mr. Avila had been vice president and assistant general manager. Prior to his election to that post in 1957, he was vice president in charge of engineering and construction.

He first joined the Massachusetts utility in 1929, after receiving his degree in electrical engineering and business administration from Harvard.

Hamill To Top Jamaica Utility Post

J. Marshall Hamill has been elected to the position of president of the Jamaica Public Service Co., Ltd., according to a report from Richard N. Benjamin, chairman of the board.

He succeeds George W. MacDuff, who retired last month for reasons of health.

Mr. Hamill has been vice president of Stone Webster Engineering Corp., and resigned that position to

(Continued on page 104)

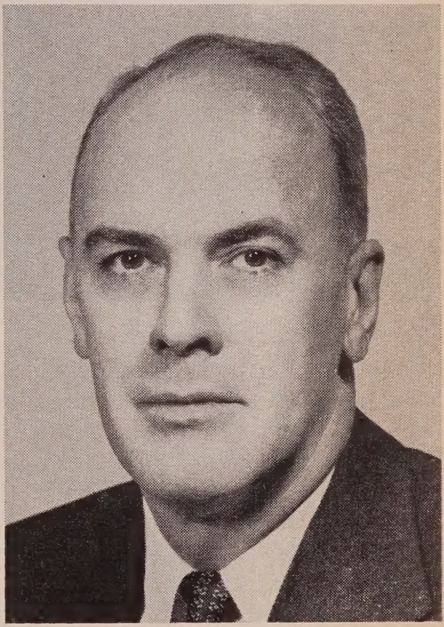
Elect MacDonald Potomac Edison President

The directors of the Potomac Edison Co. have elected R. G. MacDonald president. His election follows the resignation of former president D. E. Stultz, whose activities have been restricted by ill health since the first of the year.

Mr. MacDonald has been vice-president—marketing of the West Penn Power Co. since 1955. Both companies are in the West Penn Electric System.

A 29-year veteran with West Penn, Mr. MacDonald's most recent responsibilities included sales, promotion and development, activities, including commercial, industrial, municipal, residential and farm markets, as well as area development, public relations, and advertising.

Leading up to this position he had served successively in lines and construction work, district manager, division manager, assistant vice president, and manager of general services.



R. G. MacDonald

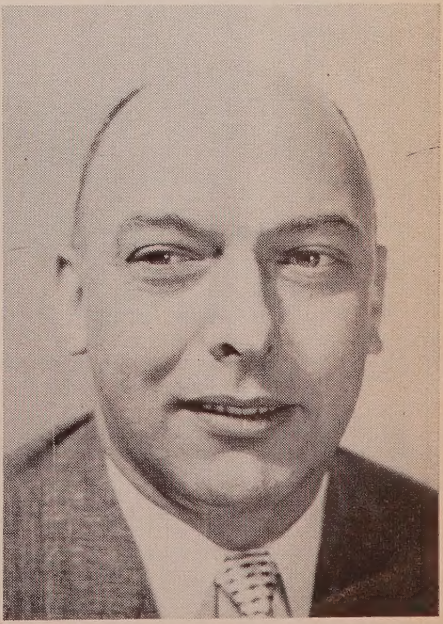
He is currently chairman of the EEI sales division executive committee, as well as serving on committees of a number of other organizations.

Blanton Appointed Regional Vice Pres.

J. C. Blanton has been promoted to Regional Vice President of the A. B. Chance Co. according to an announcement by L. C. Hansen, Vice President and General Manager of the Chance Products Division.

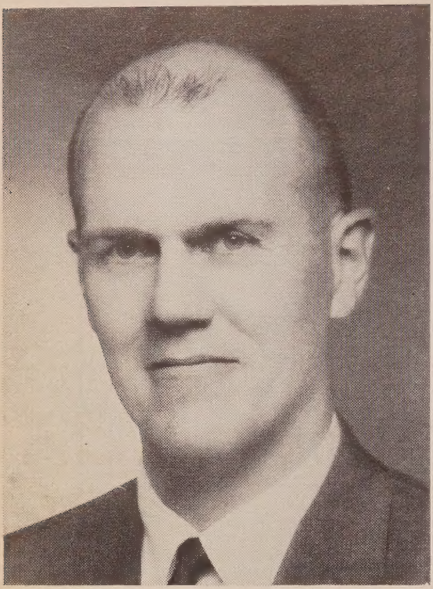
He has been with the A. B. Chance Co. since 1935 and has been in field sales work the past 15 years as Sales Representative, District Manager, and for the last six years has been Regional Manager.

Mr. Blanton has charge of sales and warehousing operations in the North Central region with headquarters in Chicago. This region serves electrical and communication utilities in Illinois, Indiana, Michigan, Wisconsin, Minnesota, North Dakota, South Dakota and the eastern third of Iowa.



J. C. Blanton

Hamill . . . *from p. 103*



J. Marshall Hamill

accept the Jamaican assignment. He first joined Stone & Webster in 1946 and has worked on the design of many types of industrial plants both in the United States and abroad.

The Jamaican company serves some 50,000 customers on the Caribbean island.

MEN OF POWER BRIEFS

Reorganization of Pacific Gas & Electric's East Bay Division generating complex brings **Howard H. Jackson** to a new position as division power generation manager. Named to assist him is **N. E. (Dusty) Rhodes,** who assumed the new title of division superintendent of power production. **E. F. Kaprielian,** senior engineer in the main office's department of steam generation, will replace Mr. Rhodes.

Official nominee for president of the American Society of Civil Engineers for 1960-61 is **Glenn W. Holcomb,** chairman of the Department of Civil Engineering, Oregon State College at Corvallis. He was nominated to head the 108-year-old society by the board of directors at its Reno convention. Retiring president is **Frank A. Marston,** Boston.

Leeds & Northrup Co. has announced several promotions and transfers. **Stephen Loidl, Jr.,** has been elected controller and continues as manager of the accounting division. **Alexander H. Reynolds, Jr.,** has been promoted to treasurer and director of finance.

Michael D. Dingman was recently appointed sales manager for the Fisher-Pierce Co. Formerly assistant sales manager, he will now be responsible for sales of all F-P products.

M. W. Smith has been named manager—California plant of General Electric's Distribution Assemblies Department. For two years, Mr. Smith has been manager—commercial engineering of the California plant.

William S. Till, in charge of mercury-vapor lamp commercial engineering activities for Westinghouse Electric Corporation's lamp division, has been elected chairman of the New Jersey Section of the Illuminating Engineering Society. This section was organized two years ago as an outgrowth of the New York Section, and now has 200 members.

The Falk Corp. has announced the appointment of **Frank H. Frandsen** as manager of the Denver district office to succeed the late Herman H. Klackner. **Robert Rock** has been named assistant to Mr. Frandsen.

George A. Cole is the newly appointed manager of Product Planning & Market Research for the General Electric Industry Control Department at Salem, Va. He succeeds **Joseph S. Quill,** who has joined the GE Advanced Product Planning Operation, Electronic Components Division, as a consultant for advanced marketing development.

Minneapolis - Honeywell Regulator Co. announces the appointment of **Dr. Van W. Bearinger** as director of research, and promotion of two other scientists to newly created positions as assistant research directors. **Dr. John N. Dempsey** and **Edward E. Rexer** are the new assistant research directors.

Robert O'Keefe has been named distributor sales manager of Burndy's utility-industrial division.

RAY-LINE LIGHTS FOR UTILITY VEHICLES

"A" SEARCHLITE
"B" REVOLVING WARNING LITE

WORK TRUCK OF LARGE UTILITY CO. ONE OF OUR "QUARTER-CENTURY" CUSTOMERS

Note: New address, new, larger quarters —65 Passaic Ave., Kearny, N. J.

Send coupon for information and free trial offer. No. 26

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Firm ____________________
Street ____________________
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THE PORTABLE LIGHT CO., INC.
65 PASSAIC AVENUE • KEARNY, N. J.

65 Passaic Ave., Kearny, N. J.

To The Editor . . .

Dear Mr. Garrett:

I have read with great interest your editorial in the May 15 issue on the "Reverse Twist On the Phobia That Russia Is Outpacing Us." To state it mildly, we fully agree with your concept and hope that more publicity can be given to the dramatic difference between our Nation and Russia in all walks of life.

My duties frequently involve public appearances and I shall make it a project to further tell the story throughout the state.

Congratulations for a splendid article.

Charles D. Sayre
Public Relations Director
Consumers Public Power District

●

Dear Editor:

On page 32 of the July 1 issue of EL&P I notice that the "IROQUOIS" apartments are listed as "Largest all-electric apartment house in the U. S."

Since I work actively in this field, I would like to call your attention to the fact that there is an apartment building in Fort Lauderdale which has 16 stories with a total of 185 units, All Electric-All Medallion. The "IROQUOIS" is only 13 stories with 132 units. In view of this. I doubt that is is the largest in the U. S.

I will admit, however, that if the "IROQUOIS" were categorized possibly it is the largest in its area. For instance, the apartment building here was reported to be the first management type co-operrative apartment building developed under Section 213 of the National Housing Act, but was not advertised as the largest apartment building in the U. S.

Since we are all interested in promoting the same thing, "electricity," I thought that my letter would be of interest to you. I am in no way criticizing your article, but merely bringing you up to date on the progress of our industry.

Very truly yours,
John W. Ray
Sales Department
Florida Light and Power Co.

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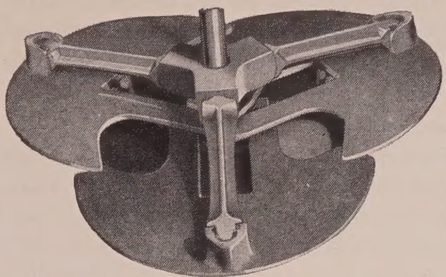

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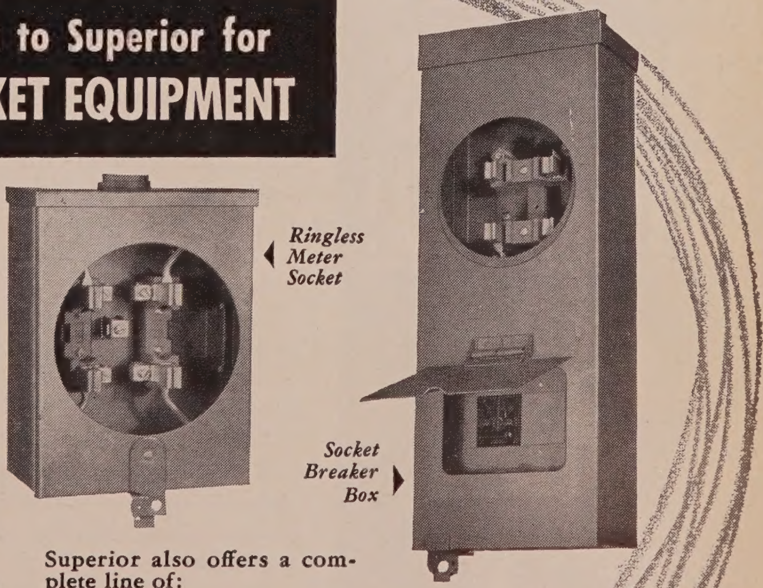

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Good Structural Practices . . .

(Continued from page 63)

tem are called upon to act as redundant bracing for the compression leg of a tower and cannot act as part of a compression system if they are too limber.

So, designing to meet the NESC requirements, is not the entire answer to a good tower design. Too much is left to the discretion of the designer and, where he is bidding in competition with others, it is understandable if he takes full advantage of anything that would reduce the weight of the tower. A design bought on the basis that it presents the lightest tower of all those submitted represents a practice that is dangerous and could lead to serious trouble.

Good tower design requires, also, faithful application of unbiased, sound, practical structural engineering. If towers are bought on a design furnished by the fabricators, the towers should be thoroughly checked first in order to see if they meet the Code and to insure their conformity with good structural practices.

The ideal way of buying towers is for all fabricators to bid on the same design. The tower could be completely designed by the purchaser or his consulting engineers and then released for bids. Each fabricator then would be faced with no controversial design decisions, no interpretations of the NESC, and each could bid on the towers on an easy and relaxed basis. This would result in very keen competition and the purchaser would benefit. This practice would open the door to smaller fabricators who have had no tower design experience but are well equipped to detail and fabricate towers.

Discussions with several fabricators about this practice of having all bidders bid on a pre-designed tower showed that they are all for it. The story is the same in all cases. Essentially they are steel fabricators and would prefer to get out of the engineering end of the business.

This does not imply that fabricators as a rule are poor designers. On the contrary, we have met some that are brilliant and outstanding.

Optimum Design

An optimum design of a tower can be accomplished by considering the following:

A. Selection of design loading conditions comparable with a realistic appraisal of the anticipated loads, many of which are not covered by the NESC.

B. Use of Overload Factors as specified in NESC.

C. Specification of the correct yield point.

D. Extensive studies on various configurations to achieve optimum strength with the least materials.

E. Selection of minimum member sizes by the use of a computer program which selects them automatically.

F. Incorporation of high strength steel at advantageous points.

G. Strict attention to joint details so that eccentricities are reduced to a minimum.

H. Provision for resisting horizontal shears by adequately reinforcing the leg below ground.

I. Use of a conservative compression formula.

J. Restricting the L/r ratio for tension members to not more than 500.

K. Basing all designs on good structural practices particularly on items not covered in the NESC.

Summing up, it is a wonder that towers designed by fabricators as part of a price-per-pound package deal in the past have done as well as they have. Perhaps the "broken wire" requirement has provided the reserve strength needed in the tower to overcome any design deficiencies that might be present. Now that many utilities are eliminating this condition, tower design must be handled more realistically.

Computer Control . . .

(Continued from page 61)

puter also recognize and provide for such possibility. We must develop adequate operating experience before all factors can be properly assessed.

Hardware items needed to produce a sophisticated design are not all yet available on the market as standard products. For this reason, costs of many areas of plant automation are high. Likewise, the characteristics of many standard components are not capable of matching the full potential of computing equipment as applied to control. The reliability, accuracy and speed of response of present-day power plant controls do not appear to equal the parallel characteristics of computers.

Computer programming is a tedious and costly necessity. The worth of computing equipment would be greatly enhanced if the programming functions could be simplified and made more easily understandable. Streamlining and standardizing of symbolic representation of block logic diagrams are also needed.

The huge economic investment in large control generating stations and exciting development in control technology, are the incentive and vehicle of continued betterment of plant design and improvement in power plant product. If tomorrow's energy demands are to be fulfilled, the power plant designer will continue to look to the controls industry for more and more advancement in instrument and control technology.

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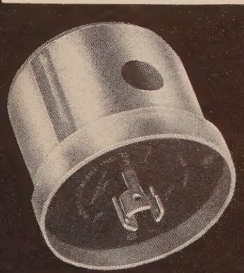

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